AN EVIDENCE-BASED APPROACH TO RECALIBRATING WYOMING'S BLOCK GRANT SCHOOL FUNDING FORMULA

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Wyoming Legislative Select Committee on Recalibration

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EXECUTIVE SUMMARY

Since 1997, Wyoming has been a leader among the fifty states in estimating and funding the resources needed to provide all of its K-12 school children an adequate education. Adequacy is best defined as the cost of providing educational programs and services so that all – or almost all – children have an equal opportunity, in Wyoming called "the educational basket," to meet high learning goals. Following the Supreme Court ruling in *Campbell County v. State*[1] (hereinafter *Campbell I*), which directed the Legislature to define a "proper" education or the "the basket" of educational goods and services every child in Wyoming should receive, the State embarked on a continuing process to determine the resources needed to provide that basket and to ensure that school districts had adequate funding to provide that basket at the local level.

In subsequent rulings on the constitutionality of the school funding systems that have been developed, the Wyoming high court required that the system be recalibrated at least every five years. In March 2005, the Wyoming Legislature contracted with Lawrence O. Picus and Associates to conduct the second recalibration of the funding system – which is to be in place for the 2006-07 school year. The purpose of this effort was to recalibrate the basket of educational goods and determine the cost of providing them for all public school children in Wyoming.

The model used by Lawrence O. Picus and Associates relies on the evidence-based approach, developed by the firm's principal partners Allan Odden and Lawrence Picus. Working closely with the Legislature's Select Committee on Recalibration, The Legislative Service Office and the Wyoming Department of Education, Lawrence O. Picus and Associates conducted an extensive review of the resources needed to ensure that Wyoming students will have access to an educational basket designed to help them meet state proficiency standards, and developed a

[1] *Campbell County School District v. State*, 907 P2d 1238 (Wyo. 1995)

funding model to allocate resources to each of the 48 school districts in the state. The evidence-based approach uses evidence from three sources:

1. Research with randomized assignment to the treatment (the so-called "gold standard" of evidence);
2. Research with other types of controls or statistical procedures that can help separate the impact of a treatment; and
3. Best practices either as codified in a comprehensive school design or from studies of impact at the local district or school level.

The approach to recalibration in Wyoming also relies on the directions established by the Wyoming Supreme Court in its *Campbell I, II, and III* decisions, as well as decisions by the Wyoming Legislature, recommendations from several Professional Judgment Panels, and the Select Committee for whom this report was prepared.

The evidence-based approach to recalibrating the Wyoming Block Grant first draws from these sources of evidence to recalibrate the level of resources needed in the school prototypes used in the Wyoming Block Grant Funding Model to deliver the state's academic "basket" of subjects, with the goal of having Wyoming's students meet the state's established performance goals. These initial evidence-based recommendations were reviewed by the Select Committee, then reviewed by professional educators in Wyoming, and then reviewed again by the members of the Legislature's Select Committee for final approval.

The approach began with a comprehensive review of current research on education and student learning that led to the development of an initial set of recalibrated school based resources for Wyoming schools. This model was presented to the Select Committee on six occasions between April and November 2005. During these meetings Picus and Associates staff

worked closely with members of the Select Committee to refine the model so it more appropriately met the specific requirements of the state of Wyoming.

In addition to the six meetings with the Select Committee, a series of six professional judgment panel review meetings were held in three separate locations across the state in June, 2005. At these meetings, over 200 educators from all of the 48 school districts were given the opportunity to review and comment on the proposed resource model developed by Picus and Associates. During those meetings it became clear that an additional Professional Judgment meeting with representatives of small schools would be helpful. That meeting was held on August 1, 2005 in Cheyenne and attended by approximately 30 educators from across the state. The results of these discussions were summarized and brought back to the Select Committee along with the recommendations of Lawrence O. Picus and Associates for revisions to the recalibrated funding model.

This report describes in detail the results of the work of the Select Committee, the Professional Judgment Panels, the Legislative Service Office and the Wyoming Department of Education – along with the staff of Lawrence O. Picus and Associates to identify the resources needed at the school and district level to provide the education basket for all Wyoming school children.

The core of the model is a school-based set of resources identified in a series of prototype schools. These resource proposals are displayed in Table 1. Drawing from the current system, the process began with three prototypes, an elementary, middle and high school with enrollments of 288, 315 and 630 students respectively (as shown in Table 1). Because of the many small schools in Wyoming, it soon became clear that additional, smaller prototypes would further clarify the efforts to estimate resources for schools. At the elementary level, the Select

Committee agreed that the state should maintain its commitment to class sizes of 16. A 288 student elementary school (this includes a full day kindergarten, a change from the current elementary prototype that used half day enrollments for kindergarten) would then have three classrooms of 16 children in each of the six grades K-5.

Since smaller schools would have fewer classes per grade, additional elementary prototypes – 2 and 3 section schools – were created at the elementary level, with 192 and 96 students respectively.[2] The same logic was used to create secondary school prototypes of 105, and 210 as well, and for high schools in addition to the 630 student prototype, a 315 student prototype. For schools smaller than the smallest prototypes (96 elementary and 105 secondary) there are a number of alternative strategies that have been proposed. Table 2 provides a summary of the personnel resources generated for each of these prototype schools.

For very small elementary schools, the proposed model prorates the resources of the 96 student prototype to 49 students. This would result in 3.6 teachers in a school of 49 students along with the other staff generated by the model. For enrollments less than 49 students, small schools are staffed with one assistant principal position and one teaching position for each seven students. The Select Committee has recommended that elementary schools with between 49 and 96 students receive six teachers, one for each grade level.

For small secondary schools with fewer than 105 students, the model resources schools at the same level as the 105 student secondary school prototype. This would result in a total of seven teachers at the school site. The Select Committee has recommended an increase to a minimum of nine teachers for these small secondary schools.

[2] A one unit school has one classroom for each grade, while a two unit school would have two classrooms for each grade.

Finally, many schools in Wyoming have alternative grade structures that do not fit into the K-5, 6-8 and 9-12 prototypes that were developed. With the advice of the professional judgment panels including the small school panel, and the Select Committee, additional approaches were established to allocate resources to schools with varying grade levels. Generally children in grades K-6 are resourced at elementary school prototype models, and children in grades 7-12 are treated as secondary school students and resourced as a school with that number of secondary students.

The final result of this process is a new funding model for the State of Wyoming. If enacted by the Legislature, it would replace the existing funding model. Below, the Summary of Wyoming Recalibration Recommendations lists all of the assumptions and data points that are used in the model. The new model is school- rather than district-based. In other words, the model builds resources from the school level up to the district level, generating resources for individual schools on the basis of school enrollment, and the characteristics of the children attending the school. In addition to providing teaching resources, strategies for at risk children, school site administration and professional development are addressed based on the evidence from current research. The model also provides resources for instructional materials, technology and student activities.

Once the instructional resources have been estimated, the model also relies on evidence-based allocations of resources for school custodial services, district maintenance and utility expenditures and for central office administration. All of these are summed to estimate total school district resources.

The largest component of any school district budget is personnel costs. Extensive analyses of the market for teachers were conducted and that information was used to estimate a

market-based average salary for teachers. As mandated by the Wyoming Supreme Court, actual cost-based allocations to school districts are based on the average experience and education of the teachers in each district, as compared to the state average. Similar analyses for salaries of other positions were conducted as well, and an appendix to the report documents how adjustments for education, experience and, where appropriate, level of responsibility are made. The model also includes an Hedonic Index to adjust salary figures for regional cost differences, which can be used in place of current practice that uses the Wyoming Cost of Living Index (WCLI).

The following pages summarize each of the recommendations for the recalibrated school-funding system. Following this summary, Table 1 describes in Matrix form of all of the recommendations for resources at prototype schools of 288 (elementary), 315 (middle) and 630 (high school) students. Table 2 offers a detailed analysis of the personnel resources provided to schools for many of the additional prototypes generated through this study.

SUMMARY OF WYOMING RECALIBRATION RECOMMENDATIONS:

Full-Day Kindergarten	Allowed for all elementary schools
Class Size:	16 for grades K-5, 21 for grades 6-12
Core teachers:	Elementary ADM divided by 16 Secondary ADM divided by 21
Specialist teachers:	20 percent of core teachers
Minimum teachers:	Consultants recommend 3.6 for elementary school with 49 or more ADM Committee voted for 6.0 for elementary school with 49 to 96 ADM Consultants recommend 7.0 for secondary school with 49 or more ADM Committee voted for 9.0 for secondary school with 49 or more ADM
Instructional facilitators:	1.5 in 288 ADM prototypical elementary school 1.5 in 315 ADM prototypical secondary school
Tutors:	1 teacher FTE position for every 100 at-risk students
ELL:	1 teacher FTE teacher position for every 100 ELL students
Extended day:	0.25 teacher FTE positions for every 30 at-risk students
Summer school:	0.25 teacher FTE positions for every 30 at-risk students
Alternative schools:	1 AP position plus 1 teacher FTE for every 7 students
Substitutes:	Additional 5 percent of ADM generated teacher at $85/day plus 7.65 percent
Supervisory aides:	2 for 288 ADM prototypical elementary school 2.5 for 315 ADM prototypical secondary school
Pupil support:	1 FTE teacher position for every 100 at-risk students Plus 1 FTE teacher for every 250 students in secondary schools
Librarian:	1.0 for each school
Library media tech:	1.0 for 315 ADM prototypical secondary school
Principal:	1.0 for all schools down to 96 ADM elementary and 105 ADM secondary and then prorated by ADM below those pupil levels.

Assistant principal:	Begin phasing in 1 AP for every 315 students at 316 ADM secondary school; this resource added by Committee	
Secretary:	1.0 for 288 ADM prototypical elementary and 315 ADM prototypical secondary school	
Clerical:	1.0 for 288 ADM prototypical elementary school 1.0 and 2.0 for 315 ADM prototypical middle and high school	
Books/Ins. Materials:	$285.47/elementary and middle school ADM $349.66/high school ADM	
Computers, equipment:	$250/ADM	
Special education:	100 percent state reimbursement	
Gifted:	$25/ADM	
Vocational education:	0.29 times FTE Voc Ed ADM/21 additional teacher units $7,731/FTE Voc Ed teacher for equipment and supplies	
Student activities:	$250/ADM	
Professional development:	In addition to the above instructional facilitators/coaches -- 5 extra days in teacher yearly contract, at $205 per day -- Plus $100/ADM for trainers	
Assessment:	In addition to the above professional development resources, $28.50/ADM	
Central office staff:	District ADM 500 and below:	3 admin and 3 secretarial
	District ADM from 500 to 1000:	prorate an additional admin and secretarial position
	District ADM at 1000:	4 admin and 4 secretarial proportionately more for districts with ADM greater than 1000
Central office expenses	$300/ADM	
Transportation:	100 percent state reimbursement	
Food services:	No support; assumed to be self supporting program (Recommend further study in next interim)	

Maintenance and operations:	New formulas based on ADM, gross square footage, number of buildings and rooms, for custodians, facilities maintenance, groundskeepers
M & O supplies:	$0.55 per 110 percent of gross square feet of instructional space
Utilities:	Actual 2004-2005 expenditures by district inflated up in subsequent years by WCLI
School adjustments:	For all schools with 49 or fewer ADM, resource with 1 AP position plus 1 FTE teacher position for every 7 students for all staff
	Minimum 6 teachers in elementary school from 48-96 ADM
	Minimum of 9 core and specialist teachers in secondary school with more than 49 ADM
	For a K-5 or K-6 school, resource as elementary school
	For a K-7, K-8 or K-9 school, resource K-5 as elementary school and rest as middle school
	For K-12 school, resource K-5 as elementary, 6-12 as secondary school for all teachers and pupil support staff, and by elementary, middle and high school for other resources
	For 6/7-12 school, resource as secondary school for all teachers and pupil support staff, and as middle or high school for other resources

Average Salaries:

Teachers	$ 42,982
Teacher with 5 extra days:	$ 42,007
Principals	$ 66,110
Assistant principals	$ 55,442
Superintendents	$ 90,200
Assistant superintendents	$ 72,160
Business managers	$ 58,302
Aides	$ 14,828
Median technician salary	$ 36,754
Central office secretary	$ 28,975
School secretary	$ 26,040
School clerical	$ 19,656
Maintenance and operations:	
Maintenance/groundskeepers	$ 30,489
Custodians:	$ 24,521

Benefits:	19.66 percent plus $7,235 for health
Regional cost adjustment:	Use a newly developed Hedonic Index (this recommendation is still being discussed by the Committee)
External cost adjustment:	Use the WCLI each year to adjust all dollar/price/salary figures until the next recalibration

Table 1
Recommended Recalibrated Resources for Wyoming's
Prototypical Elementary, Middle and High Schools

Resource Element	Elementary Schools	Middle Schools	High Schools
School Characteristics			
School configuration	K-5	6-8	9-12
Prototypic school size	288	315	630
Class size	K-5: 16	6-8: 21	9-12: 21
Full-day kindergarten	Yes	NA	NA
Number of teacher work days	188 teacher work days, so an increase of 5 days.	188 teacher work days, so an increase of 5 days.	188 teacher work days, so an increase of 5 days.
Percent Disabled (state. avg.)	13 %	13 %	13 %
Percent Poverty (st. avg. free & reduced lunch)	30 %	28 %	22 %
Percent ELL (st. avg.)	5 %	5 %	5 %
Percent Unduplicated At-Risk Pupil Count (estimated)	40 %	40 %	40 %
A. Personnel Resources			
A1a. Core Teachers	18.0	15.0	30.0
A1b. Specialist teachers	20% more: 3.6	20% more: 3.0	20% more: 6.0
A1c. Instructional Facilitators/ Mentors/Coaches	1.5	1.5	3.0
A2a. Teacher tutors for at-risk students	1 FTE teacher tutor for every 100 "at-risk" students: 1.2	1 FTE teacher tutor for every 100 "at-risk" students: 1.2	1 FTE teacher tutor for every 100 "at-risk" students: 2.4
A2b. Additional Teachers over those for at-risk for ELL students	An additional 1.0 FTE teacher for every 100 ELL students 0.15	An additional 1.0 FTE teacher for every 100 ELL students 0.16	An additional 1.0 FTE teacher for every 100 ELL students 0.32

Table 1 (Continued)
Recommended Recalibrated Resources for Wyoming's
Prototypical Elementary, Middle and High Schools

Resource Element	Elementary Schools	Middle Schools	High Schools
A. Personnel, continued			
A2c. Extended-day program	0.25 teacher positions for every 15 extended-day students: 4.0 extended day teachers paid 25% of salary extra, so 1.0 FTE	0.25 teacher positions for every 15 extended-day students: 4.0 extended day teachers paid 25% of salary extra, so 1.0 FTE	0.25 FTE position for every 15 extended-day students: 8.0 extended day teachers paid 25% of salary extra, so 2.0 FTE
A2d. Summer school	0.25 teacher positions for every 15 summer students: 4.0 summer teachers paid 25% of salary extra, or 1.0 FTE	0.25 teacher positions for every 15 summer students: 4.0 summer teachers paid 25% of salary extra, or 1.0 FTE	0.25 FTE position for every 15 summer students: 8 summer teachers paid 25% of salary extra, or 2.0 FTE
A2e. Alternative School	NA	NA	1 AP position plus 1 Teacher position for every 7 students
A3. Substitutes	Additional 5% of ADM generated teacher at $85/day plus 7.65 %	Additional 5% of ADM generated teacher at $85/day plus 7.65 %	Additional 5% of ADM generated teacher at $85/day plus 7.65 %
A4. Aides	2.0	2.0	5.0
A5. Pupil support staff	1.0 FTE position for every 100 at-risk students: 1.2	1 for every 100 at-risk students plus 1.0 guidance counselor for every 250 students 2.5 total	1 for every 100 at-risk students plus1.0 guidance counselor for every 250 students 5.0 total
A6. Librarians/media technicians	1.0 Librarian	1.0 librarian plus 1.0 librarian technician	1.0 librarian plus 2.0 librarian technician
A7. School Administration	1	1	2
A8. Secretary/Clerical	1.0 Senior secretary 1.0 Clerical/data	1.0 Senior secretary 1.0 Clerical/data	1.0 Senior secretary 4.0 Clerical/data

Table 1 (Continued)
Recommended Recalibrated Resources for Wyoming's
Prototypical Elementary, Middle and High Schools

Resource Element	Elementary Schools	Middle Schools	High Schools
Dollar per Pupil Resources			
B. Supplies and Instructional Materials	$285.57/ADM	$285.57/ADM	$349.66/ADM
C. Equipment and Technology	$250/ADM for technology and equipment	$250/ADM for technology and equipment	$250/ADM for technology and equipment
D. Food Services	Self supporting	Self supporting	Self supporting
E. Categorical Aids			
E1. Disabled students	100% state reimbursement.	100% state reimbursement.	100% state reimbursement.
E2. Gifted student resources	Appropriate services required; additional $25/ADM	Appropriate services required; additional $25/ADM	Appropriate services required; additional $25/ADM
E3. Vocational Education	Current system for high school only: extra weight of 0.29 for all FTE vocational education students plus $7,731 vocational education teacher in school		
F. Student Activities	$250 per ADM to the district	$250 per ADM to the district	$250 per ADM to the district
G. Professional development	Included above: Instructional facilitators Planning & prep time Additional: 5 summer days $100/ADM for other PD expenses – trainers, conferences, travel, etc.	Included above: Instructional facilitators Planning & prep time Additional: 5 summer days $100/ADM for other PD expenses – trainers, conferences, travel, etc.	Included above: Instructional facilitators Planning & prep time Additional: 5 summer days $100/ADM for other PD expenses – trainers, conferences, travel, etc.
H. Assessment	$28.50/ADM	$28.50/ADM	$28.50/ADM
I1a. Custodial Services	2.0	2.0	4.0
I1b. Maintenance	Not a School Level Function, See pp. 122-126		
I1c. Groundskeepers	Not a School Level Function, See pp. 126-133		
I1d. Supplies			
I1e. Utilities			
I2. Central Office Staff	Not a School Level Function, See pp. 135-142		
I2. Central Misc. Exp	$300/pupil	$300/pupil	$300/pupil
I3. Transportation	100 % state reimbursement	100 % state reimbursement	100 % state reimbursement

Table 2
Summary of Personnel By Prototype

Personnel Resource Category	Elementary			Middle			High School			
School Enrollment	**96**	**192**	**288**	**105**	**210**	**315**	**105**	**210**	**315**	**630**
Core Teachers	6.0	12.0	18.0	5. 0	10.0	15.0	5.0	10.0	15.0	30.0
Specialist Teachers	2.4	4.8	7.2	2.0	4.0	6.0	2.0	4.0	6.0	12.0
Instructional Facilitators	0.5	1.0	1.5	0.5	1.0	1.5	0.5	1.0	1.5	3.0
Teacher Tutors (state avg.)	0.4	0.8	1.2	0.5	0.8	1.3	0.5	0.8	1.3	2.6
ELL Teachers	0.05	0.10	0.15	0.05	0.10	0.16	0.05	0.10	0.16	0.32
Extended Day Program	0.33	0.67	1.0	0.33	0.67	1.0	0.33	0.67	1.0	2.0
Summer School	0.33	0.67	1.0	0.33	0.67	1.0	0.33	0.67	1.0	2.0
Substitutes	5 % of ADM generated teacher positions at $85/day plus 7.65%									
Aides	0.67	1.33	2.0	0.67	1.33	2.0	0.8	1.67	2.5	5.0
Pupil Support	0.4	0.8	1.2	0.8	1.67	2.5	0.8	1.67	2.5	5.0
Librarian media technician	0.5 0.0	0.75 0	1.0 0	1.0 0.33	1.0 0.67	1.0 1.0	1.0 0.33	1.0 0.67	1.0 1.0	1.0 2.0
School Administration	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0
Secretary/ Clerical	1.0 0	1.0 0.5	1.0 1.0	1.0 0.33	1.0 0.67	1.0 1.0	1.0 0.67	1.0 1.33	1.0 2.0	1.0 4.0
Special Education	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Custodial	1.0	1.5	2.0	1.0	1.5	2.0	1.0	1.5	2.0	4.0

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INTRODUCTION

In 1997, The Wyoming Supreme Court, in *Campbell County v. State*[3] (hereinafter *Campbell I*), ruled the state's school funding system was unconstitutional. The Wyoming Supreme Court determined that education was a constitutionally protected "fundamental interest." The Court directed the Legislature to define a "proper" education – "the basket" of educational goods and services – every child in Wyoming should receive.[4]

In response to the Court's ruling, the Wyoming block grant funding model was developed. In essence, the purpose of this effort was to define the basket of educational goods and determine the cost of providing them for all public school children in Wyoming. The model developed in 1997 used professional judgment panels to establish prototype schools and the resources they would need to provide the basket. As required by the Court, the funding system needed to rely on a cost-based funding model.

Once implemented, the model was challenged in court in *State v. Campbell County School District*[5] (hereinafter *Campbell II*). In February, 2001, the Wyoming Supreme Court found that the core of the funding model and the methodologies used to cost out the resources within the model were constitutional. Although the court found that core of the funding model – the prototypes for elementary, middle, and high schools – was constitutional, it found that some individual components of the funding model did not meet constitutional muster and required the

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[3] *Campbell County School District v. State*, 907 P2d 1238 (Wyo. 1995)
[4] *Campbell I*
[5] *State v. Campbell County School District*, 19 P.3d 518 (Wyo. 2001)

Legislature to revise them. Subsequently, the legislature enacted a number of revisions to the funding model and implemented them in the 2002-03 school year.

One major component of the Court's ruling in *Campbell II* was that the model needed to be recalibrated at least every five years. To comply with that requirement, the Legislature has contracted with Lawrence O. Picus & Associates to recalibrate the Wyoming cost-based funding model with any changes to be implemented in the 2006-07 school year. The goal of this effort is to ensure that the model components remain valid, cost-based, and relevant for the times.

Historical Development of the Wyoming Cost-Based Funding Model

Faced with the Court's first ruling in *Campbell I*, the state undertook an effort to define a proper education and then to determine the resources needed to provide the educational basket that defined a proper education. A professional judgment approach using the expert views of educators from both within and outside of Wyoming was used to estimate the resources needed to provide the educational basket for prototypical elementary, middle and high schools, with an assurance that all, or almost all, school children would meet Wyoming's educational standards.

The core of the current Wyoming funding model is based on three school-level prototypes – an elementary school of 264 students (with half-day kindergarten), a middle school of 300 students, and a high school of 600 students – and the personnel and non-personnel resources within those prototypes. The resources within those school-level prototypes were enumerated through the professional judgment methodology, a process of engaging professional educators in determining the appropriate levels of resources within a school to meet a given standard set by the state based on their professional expertise and experiences. The Wyoming Supreme Court in *Campbell II* found that the average class sizes and staffing levels determined

in the school prototypes "not unreasonable" and "capable of supporting a constitutional school finance system."

In addition to the school-based prototypes, resources (and their costs) for district administration are included in the Wyoming cost-based funding model. District special education and transportation program expenditures are reimbursed one hundred percent by the state. However, the state continues to explore ways to create cost-based methods of funding districts for special education and transportation.

In addition to defining the basket of educational goods and services to be provided and enumerating the resources necessary to deliver the education basket, the Wyoming Supreme Court also ruled that the conversion of those personnel and non-personnel resources into dollars was to be cost-based. The costs of the resources to deliver the basket – teachers, administrators, books, materials and physical resources, etc. – were calculated through a variety of methodologies in an attempt to make the prototypes and the funding model "cost based" in compliance with the Court's directives. The initial calculation of the costs of the funding model set the model to 1997 cost levels.

The Wyoming Supreme Court recognized that the costs of a proper education would likely differ according to student needs (e.g., at-risk students), curriculum (e.g., vocational education), school circumstances (e.g., economies and diseconomies of scale associated with size), and district circumstances (e.g., diseconomies of scale associated with small size or regional cost differences). Accordingly, the Wyoming funding model incorporates adjustments for above-average concentrations of at-risk students, small schools, small districts, vocational education programs, and regional cost differences. The Wyoming funding model also makes cost adjustments to school districts for cost differences associated with the education levels of

teachers, administrators and classified personnel, as well as for years of experience, and/or relative job responsibilities. Accordingly, the funds provided to school districts for certified and classified staff salaries reflect the court's requirement that adjustments for these identifiable cost differences are made.

To determine the personnel and non-personnel resources necessary to deliver the basket of educational goods and services for the original Block Grant, it was assumed that the school prototypes had the average concentration of at-risk students. That is, the personnel and non-personnel resources specified by the professional judgment panels within the base school-level prototypes to deliver the educational basket were estimated under the assumption that the school had average student characteristics for a Wyoming school, approximately 30 percent at-risk student incidence. In the *Campbell II* ruling, the Wyoming Supreme Court found the school-level prototypes to be constitutional both in nature and in the methods used for determining their costs.

The third component of the *Campbell I* ruling was the requirement that a funding mechanism for delivering the basket be established. Once a "proper" education (the basket) was defined by the Legislature and the resources to deliver the basket and their costs were determined, the Legislature implemented a block grant funding model. The block grant model generates resources at both the school and district levels. The resources are then aggregated to the district level and the state provides school districts with a block grant equal to the level of resources generated through the cost-based model. The block grant results in few restrictions as to how districts spend those resources. Estimated 2005-06 per ADM funding through the cost-based block grant funding model ranges from $8,390 for Park #6 (Cody) to $25,537 for Sheridan #3 (Clearmont), with $9,537 for the state as a whole.

In addition to the funding model, the Legislature created educational and support programs outside of the Wyoming cost-based funding model. For the 2004-2005 school year, these programs included: summer school ($4.5 million); full-day kindergarten option ($6.0 million); the Wyoming Reading Assessment and Remediation Act that targets students in grades 1 and 2 ($3.7 million); and major maintenance for school buildings ($33.7 million). Lawrence O. Picus & Associates has been asked to explore how these programs might be integrated into the Wyoming cost-based funding model as part of the current recalibration effort.

In its *Campbell II* ruling, the Wyoming Supreme Court directed the Legislature to adjust the model for inflation (known in Wyoming as the External Cost Adjustment) at least biennially and further directed the Legislature to review all model components "every five years...to assure it remains an accurate reflection of the cost of education." The state's efforts to make sure the costs of the model are up-to-date on a regular basis led the state to a full recalibration of the funding model in 2002. Since 2001-02, the state has adjusted the costs within the model using an external cost adjustment to account for inflationary pressures on the costs of the goods and services contained in the basket of educational goods.

Wyoming law states that "[n]ot less than once every five (5) years, the legislature shall provide for the reevaluation of the education resource block grant model to determine if modifications are necessary to ensure it remains cost-based in light of changing conditions and modifications to law (W.S. 21-13-309(t))." The Legislature has contracted with Lawrence O. Picus & Associates to conduct a model recalibration to ensure the model remains cost based in time for consideration during the 2006 budget session and for implementation in the 2006-07 school year.

In the sections that follow, we describe our evidence-based approach to recalibrating the prototype schools. This approach relies on current research to develop prototype schools that can reasonably be expected to offer an educational program that will enable all – or almost all – Wyoming school children to meet the state's educational proficiency standards. The text describes the current Wyoming funding model as it pertains to each component of the funding model, then discusses current research findings, and finally offers a proposal for how this component should be treated for each of the prototypical schools. This process culminates in Table 1 which is a summary of the resources proposed for the recalibrated Wyoming school prototypes.

The prototypical models described in this document were reviewed by the Select Committee on Wyoming School Finance on four occasions (April 18-19 in Gillette; May 26-27 in Casper; June 30 – July 1 in Casper; August 23 in Casper) and by a series of professional judgment panels across the state on June 7 (Douglas), June 8 (Thermopolis), and June 9 (Rock Springs), and by a panel focusing on small schools on August 1 (Cheyenne). This document represents the new decisions the Committee made at its August 23rd meeting in Casper, and a cost model is being developed reflecting all decisions made by the committee through that date. In those cases where the Committee decided to look at various options, the cost model provides simulation options to allow exploration of alternative scenarios. This model will include the adjustments for school, district, student, and price differences described in this document. Details of this process can be found in our April 15, 2005 report to the Select Committee titled *Work Plan for the 2005 Recalibration of the Wyoming Resource Block Grant Education Funding Model*. This report is available on the Legislative Service Office web site at: http://legisweb.state.wy.us/2005/interim/schoolfinance/schoolfinance.htm.

USING THE EVIDENCE-BASED APPROACH IN WYOMING

Since 1990, the school finance community has developed a number of alternative methods for determining appropriate school resources to deliver the content standards in each state's education basket. These are summarized in Odden (2003), an article that identifies strengths and weaknesses of each approach. The current Block Grant in Wyoming was developed using the Professional Judgment approach, which uses the expertise and experiences of professional educators to specify resources for prototypical elementary, middle and high schools. The current recalibration effort takes a similar approach, in that it identifies resources for an expanded set of prototypical schools, but uses evidence from research and best practice as well as the professional judgment of education leaders to recalibrate the resource elements for Wyoming's prototypical schools. This approach, formally called the Evidence-Based approach, was developed by the lead partners of Lawrence O. Picus and Associates, Drs. Lawrence Picus and Allan Odden, and is an approach that they have used in several states (e.g., Odden, Picus, Fermanich & Goetz, 2004: Odden, Picus & Fermanich, 2003; Odden, Fermanich & Picus, 2003; Odden, 2000). More precisely, the Evidence-Based approach uses evidence from three sources:

1. Research with randomized assignment to the treatment (the so-called "gold standard" of evidence);
2. Research with other types of controls or statistical procedures that can help separate the impact of a treatment; and
3. Best practices either as codified in a comprehensive school design (e.g., Stringfield, Ross & Smith, 1996) or from studies of impact at the local district or school level.

Our approach to recalibration in Wyoming also relies on the directions established by the Wyoming Supreme Court in its *Campbell I, II, and III* decisions, as well as decisions by the

Wyoming Legislature, recommendations from the various Professional Judgment Panels, and the Select Committee for whom this report was prepared.

The Evidence-Based approach to recalibrating the Wyoming Block Grant first draws from these sources of evidence to recalibrate the level of resources needed in the school prototypes used in the Wyoming Block Grant Funding Model to deliver the state's academic "basket" of subjects, with the goal of having Wyoming's students meet the state's established performance goals. As stated above, following the initial evidence-based analysis, our recommendations were reviewed by the Select Committee, then reviewed by professional educators in Wyoming, and then reviewed again by the members of the Legislature's Select Committee for final approval.

The Wyoming Educational Basket

As directed by the Wyoming Supreme Court, the Legislature identified the basic educational "basket" that needs to be delivered to every Wyoming student. As with past studies, we use that standard as the basis for identifying the resources required for prototypical schools. The expectations included in Wyoming's Academic Standards, which define what all Wyoming's students are to be taught, include the following:

1. Mathematics
2. Reading/English/language arts
3. Science
4. History/social studies
5. Fine arts and performing arts
6. Physical education
7. Health and safety

8. Humanities
9. Career/vocational education
10. Foreign cultures and languages
11. Applied technology
12. Government and civics, including state and federal constitutions.

Below we provide details of our analysis of the prototypes, our recalibration analysis and our initial recommendations.

Cross Walking the Current School Prototype Template with the Recalibrated Template

Before we describe the recalibration process, we refer the reader to Chart 1, which crosswalks the resource items that are part of the current prototype template with the resource items in the proposed template. Because we were asked to make all elements in the prototype models more transparent, to incorporate into the Block Grant resources for at-risk students, and if possible to incorporate resources for vocational education, we expanded the rows of items for each prototype school. The bulk of the changes we have made are reflected in Chart 1.

As the chart shows, and as we explain in the paragraphs below, our approach was to "break out" the teacher category into three different types of teachers – core, specialist and instructional coaches. We also add a second category of teachers for at-risk students. Teachers in this second category are identified on an FTE basis for four integrated strategies for serving at-risk students – tutors, extra help for ELL students, staff for extended day, and staff for summer school programs. Substitute teachers are displayed on line 3, following the more detailed specification of teacher resources.

Chart 1
Resources Items in Current Prototypes versus Resource Items in Recalibrated Prototypes

Current Prototypes	Recalibrated Prototypes
A. Personnel	A. Personnel
1. Teachers	1. Teachers
	1a. Core Teachers
	1b. Specialist Teachers
	1c. Instructional Facilitators/Coaches
	2. At-Risk Teachers
	2a. Tutors
	2b. FTE for ELL Students
	2c. FTE for Extended Day
	2d. FTE for Summer School
2. Substitute Teachers (5%)	3. Substitute Teachers (5%)
3. Aides (FTE)	4. Aides (FTE)
4. Pupil Support	5. Pupil Support
5. Library Media	6. Library Media
5a. Certified Librarians	6a. Certified Librarians
5b. Media Assistant Technicians	6b. Media Assistant Technicians
6. School Administration	7. School Administration
7. Clerical/Clerical	8. Clerical/Clerical
B. Supplies and Instructional Materials	B. Supplies and Instructional Materials
C. Equipment	C. Equipment and Technology
D. Food Services	D. Food Services
E. Categorical Aids	E. Categorical Aids
1. Special Education	1. Special Education
2. Gifted	2. Gifted
F. Student Activities	F. Student Activities
G. Professional Development	G. Professional Development
H. Assessment	H. Assessment
I. District Expenditures	I. District Expenditures

Aides are listed on line 4 for the recalibrated prototypes. The resource line items following substitute teachers are similar in both the current and recalibrated columns of Chart 1, although in the recalibrated column each row has been renumbered to reflect the additional category of teachers (i.e. row 4 in the current prototype becomes row 5 in the recalibrated prototype), and we have added technology to the equipment line. In addition, our professional

development recommendations are much more elaborated than current professional development resources. Finally, the categorical aids will continue to include both special education and gifted education. All of the rows in Chart 1 are described in more detail below following a discussion of student enrollments, ADM, full-day Kindergarten and school size.

Average Daily Membership

Current Wyoming Block Grant. Students are counted as average daily membership (ADM) for the current Wyoming school finance formula. The ADM count actually used is the average of the previous three year's ADM, in order to cushion the impact of declining enrollments.

The evidence. Using a three year rolling average student count to cushion the fiscal impact of declining student numbers is a common practice across the country. This was an approach recommended by Cavin, Murnane & Brown (1985) in a study of this issue in Michigan.[6]

However, a rolling three year average was generally not intended for use in all schools, especially those schools experiencing enrollment growth, even though there are few such schools in Wyoming. Nevertheless, those schools should be able to use their actual student count so they have the resources to expand educational services as they grow in ADM.

Recommendation. We recommend that Wyoming continue to use a rolling three year average ADM count when student decline exists, but the actual ADM for schools with stable or

[6] The Wyoming Block Grant provides two mechanisms to "cushion" the fiscal impact of the student loss: the three year average ADM number as the student count, and then additional revenues per ADM provided through the small school and small district adjustments when enrollments dip below certain thresholds. The purpose of these adjustments is to both cushion the fiscal impact of enrollment loss and accommodate the declining economies of scale inherent in smaller educational organizations, but not to postpone reduced funding due to lower enrollments forever.

rising student counts. Thus, we recommend that the ADM count for the formula be the average of the schools' past three years ADM or the previous years ADM, whichever is larger.

Full Day Kindergarten

Current Wyoming Block Grant. Kindergarten students are counted as 0.5 students (ADM) for the current Wyoming Block Grant. The state only supports half-day kindergarten programs in the Block Grant. The state also provides – outside of the Block Grant – $1,000 for every kindergarten student (total of $6.0 million) who attends a full-day kindergarten program.

The Evidence. Research shows that **full-day kindergarten**, particularly for students from low-income backgrounds, has significant, positive effects on student learning in the early elementary grades (Fusaro, 1997; Gulo, 2000; Slavin, Karweit & Wasik, 1994). Children participating in such programs do better in learning the basic skills of reading, writing, and mathematics in the primary grades of elementary school than children who receive only a half-day program or no kindergarten at all. The most recent study of such effects was released in mid-2003 by the National Center for Education Research (Denton, West & Walston, 2003). This nationally-representative, longitudinal study showed that children who attended full-day kindergarten had a greater ability to demonstrate reading knowledge and skill than their peers in half-day programs, across the range of family backgrounds. This study also found that the more children were exposed to literacy activities in the home, the more likely they were to perform well in both kindergarten and first grade.

The effectiveness of full-day kindergarten on student achievement is well established. In the most recent meta-analysis of 23 studies comparing the achievement effect of full-day

kindergarten to half-day kindergarten programs, Fusaro (1997) found an average **effect size** of +0.77, which is quite substantial.

Recommendation. We recommend a state commitment to full-day kindergarten programs. Since recent research suggests that children from all backgrounds can benefit from full-day kindergarten programs, we recommend that the state support a full-day program for all students, at least for those parents who want their child to participate in such a program. The Professional Judgment Panels endorsed this recommendation.

The most direct way to implement this recommendation is to allow each district to count each kindergarten student that enrolls as a full 1.0 ADM in the formula in order to provide a full-day kindergarten program.[7]

It could be that legally that the issue of kindergarten falls outside of the state's constitutional mandate for public education for children aged 6-21. Thus, funding a full day kindergarten program would be providing more than the constitutional required minimum education and would reflect the state's seeking to provide the best education possible.

School Size

Current Wyoming Block Grant. Resources for prototype schools are developed on the basis of a 264 student (ADM) elementary, 300 student (ADM) middle, and 600 student (ADM) high school.

The Evidence. Research on **school size** is clearer than research on class size. However, most of the research on school size addresses the question of whether large schools – those significantly over 1,000 students – are both more efficient and more effective than smaller school units (schools of 300 to 500) – and whether savings and performance improvements can be

[7] This will also require a slight modification of the standards for elementary school buildings to provide 1 kindergarten classroom in the 1-section school, 2 kindergarten classrooms in the 2-section schools, and 3 kindergarten classes in the 3-section schools.

identified for consolidating small schools or districts into larger entities. The research generally shows that school units of roughly 300-600 elementary students and between 500 and 1,000 secondary students are the most effective and most efficient.

The following is a quote on this issue from the third edition of *School Finance: A Policy Perspective*, a school finance text written by Odden and Picus (Odden & Picus, 2004, Chapter 6):

> Analysts, however, argue that the expected cost savings from the massive school and district consolidation have not been realized (Guthrie, 1979; O'Neill, 1996; Ornstein, 1990) and that consolidation might actually harm student performance in rural schools (Sher & Tompkins, 1977) as well as have broad negative effects on rural communities (Coeyman, 1998; Seal & Harmon, 1995). If small schools or districts indeed cost more, but consolidation reduces performance and disrupts communities, the better policy choice might be to resist consolidation and provide special adjustments to compensate for the higher costs.
>
> The research on diseconomies of small and large scale generally does not support a consolidation policy. From an economic perspective, the concept of diseconomies of scale includes both costs and outputs. The issue is whether costs per unit of output are higher in small schools or districts, or put differently, whether costs can be reduced while maintaining output as size rises. In an extensive review of the literature, Fox (1981) concluded that little research had analyzed output in combination with input and size variables, and Monk (1990) concluded after assessing the meager extant research that there was little support for either school or district consolidation.
>
> For elementary schools, research knowledge is thin, but data suggest that size economies that reduce costs by more than one dollar per pupil exist up to but not beyond 200 pupils (Riew, 1986). Thus, very small schools experience diseconomies of small size and, except in isolated rural areas, potentially could be merged into larger ones. But the real opportunities for cost savings from school consolidation from these small sizes are not great, precisely because many such schools are located in isolated rural areas where there are no other schools nearby with which to consolidate.
>
> At the secondary level, the data are more mixed. Few studies exist that simultaneously assess both size and output, so scale diseconomies have not been adequately studied. Riew (1986) found that there were cost savings, below one dollar per pupil, for middle schools with enrollments above 500; again, many middle schools already enroll more than this number. In analyzing whether larger secondary schools actually provided more comprehensive programs, an argument for larger size, Monk (1987) concluded in a study of New York that program comprehensiveness increased consistently in secondary schools only for size increases up to but not beyond about 400 students. In subsequent research, Haller, Monk, Spotted Bear, Griffith, & Moss (1990) found that while larger schools offered more comprehensive programs, there was wide variation among both

> smaller and larger schools, and there was no clear [size] point that guarantees program comprehensiveness. Further, Hamilton (1983) shows that social development is better in small high schools.
>
> Studies of district size generally analyze expenditures per pupil as a function of size without an output variable, such as student achievement (Fox, 1981). To document diseconomies of district size, however, expenditures, size, and output need to be analyzed simultaneously, since the goal is to determine if costs per unit of output decrease as the number of students in the district increases. Again, in reviewing the literature, Monk (1990) concluded that definitive statements could not be made about district consolidation.
>
> In the most recent review of scale economies and diseconomies, Andrews, Duncombe & Yinger (2002) assessed both cost function and production function research. The studies reviewed generally assessed costs in tandem with student achievement outputs. The authors concluded that there were potential but modest cost savings that could be realized by consolidating districts smaller than 500 students into districts with 2,000-4,000 students. Of course this would be an option only for small districts a short distance from each other and not for rural, isolated small districts. The authors also found that the optimum size for elementary schools was in the 300-500 pupil range, and for high schools was in the 600-900 range (see also, Lee & Smith, 1997, on high school size). Both findings suggest that [the country's] very large urban districts and schools are far beyond the optimum size and need to be somehow downsized.

In other words, research suggests that elementary school *units* be in the range of 300-500 students and that secondary school *units* be in the range of 500-1000 students (Lee & Smith, 1997; Raywid, 1997/1998), rather than *larger* numbers. Evidence from comprehensive school designs, however, generally suggests school sizes of about 500 students for both elementary and secondary schools, which we would argue falls within the range of the research findings (Odden, 1997; Stringfield, Ross & Smith, 1996). Such school designers also suggest that larger schools be divided into "sub-schools," and run as "schools within schools." So a secondary school with 2,000 students would be organized into two, 1,000-student or four 500-student "sub-schools," each with a separate student body, separate principal and separate entrance, if possible (see also Murphy, Beck, Crawford, Hodges & McGaughy, 2001).

Though some of the research on "schools within a school" is mixed, the bulk of research shows that when such efforts *are implemented well*, student performance and other outcomes do rise. The recent Borman, Hewes, Overman and Brown (2003) meta-analysis of comprehensive school designs, many of which are implemented as multiple school units within school buildings, is one body of evidence. A policy brief by Wonacott (2002) from the Career and Technical Education National Dissemination Center provides an overview of the impacts of smaller learning communities generally and specifically for secondary career academies. The small-school initiative of the Bill and Melinda Gates Foundation is another support for smaller schools; indeed; Gates is providing tens of millions of dollars all around the country for large high schools to break themselves into small school units (see Dobbs, 2003, for example).

In addition, research for secondary schools also finds that curriculum offerings should emphasize a solid core of academic classes for all students (Bryk, Lee & Holland, 1993; Lee, Croninger & Smith, 1997; Newmann & Associates, 1996). Indeed, this research shows that the most effective strategy for having all students perform to proficiency on state standards, to be ready for college and the world of work in the 21st century, and to close the achievement gap between minorities and non-minorities is for high schools to offer a strong set of core academic courses in mathematics, science, language arts, history/social science, and foreign language and require all students to take the bulk of their courses from this core (Clune & White, 1992; Lee, Croninger & Smith, 1997; Madigan, 1997; Public Agenda, 1997; Steinberg, 1997), excluding altogether such low level classes as general and consumer math. This strategy would mean students take the Wyoming "basket" of courses approved by the State Board of Education. Indeed, the Education Trust argues that one of the top two strategies for closing the achievement gap between low-income students and students of color from other adolescent Americans is

having high schools prepare all students for college, i.e., to take a core of solid academics (Education Trust, 2003).[8] This is the kind of secondary education required for full participation in any and all post-high school activities, whether it is taking a job, enrolling in a two-year post-secondary institution, or attending a college or university.

Wyoming, however, presents an interesting although not unique circumstance for identifying school size. Wyoming already has numerous schools that are smaller than the above size standards. We should note, as we did above, that most of the research on school size has been conducted to determine whether smaller schools, as defined above (300-600 students), were better for students than very large schools. These is very little research on whether the very, very small school sizes in Wyoming are better for students than the "small" schools as identified by research. And in many sparsely populated Wyoming communities, the size of the school unit is a given because it reflects the number of children in that community.[9]

Recommendation. We have several recommendations. To begin, we will identify resources for the three prototypical schools currently in the Wyoming Block Grant: K-5 elementary, 6-8 middle, 9-12 high schools. Then, initially we will use the current prototypical ADM of 288 students (because we recommend full-day kindergarten) for the elementary, 315 for the middle, and 630 for the high schools.[10] As we explain in more detail in Section A1a below on class size, these figures provide a full complement of core teachers in the prototypes and allow for a more straightforward prorating of teacher resources for smaller schools in ways that do not trigger small school adjustments until schools fall below much lower numbers than

[8] The other strategy is to provide a quality teacher in every classroom, a topic addressed later in this report.
[9] School units that are co-located in one building and which have been recognized as independent small schools in the Wyoming Block Grant, could, however, be recognized as one K-8 or one K-12 school, rather than two schools (K-5 and 6-8) or three schools (K-5, 6-8 and 9-12).
[10] We have modestly increased the size of the middle and high school prototypes from 300 to 315 and 600 to 630, respectively, so that – as described below – the prototype schools produce a whole number of teachers, 15 instead of 14.7 for the middle school, and 30 instead of 28.6 for the high school.

currently trigger small school adjustments. This approach has the benefit of providing a much more sound rationale for the point at which small school adjustments are triggered as called for by the Wyoming Supreme Court in *Campbell II*.

We also will show how all the resource recommendations translate to schools that have fewer numbers of students. Thus, the final recommendations will identify the levels of resources for the following schools:

Elementary: K-5 at ADM of 288, 192, 96, 49 and ADM below 49

Middle: Grades 6-8 at ADM of 315, 210, 105 and ADM below 105

High: Grades 9-12 at ADM of 630, 315, 210, 105, ADM below 105, and a model for Alternative high schools.

In addition, we were encouraged by both the Select Committee and the Professional Judgment Panels to identify resources for prototypes that have the following grade configurations: K-12, K-8, and 6/7-12. Such prototypes will make the definition of a school in Wyoming more rational, more efficient and more cost-based. We provide three examples at this point. First, there are several examples of three entities recognized and funded as distinct schools (an elementary, middle and high school) in the current Wyoming system, that actually exist in one building. One could conceive of developing a K-12 school prototype for this situation. Second, there are examples of two "schools" of different levels (e.g., a K-2 school, and a 3-5 school) in one building, each treated as a different entity in the funding formula. Again, one could conceive of treating this as a K-5 school in the funding formula. Third, there are examples of several "small" schools housed within a variety of different buildings within one district, serving varying or even overlapping grade levels. One could conceive of closing some buildings and creating fewer K-5 schools, or even K-8 schools, if the remaining buildings were

large enough to accommodate all the students and transportation costs were not increased substantially.

We initially sought to identify a prototypical ADM for each of the three new school prototypes, but in the final analysis decided that was not needed as the final decisions on how to resource such schools was simplified. These decisions are discussed below, and again in the section further below on Small Schools.

There were several options for determining the resources for these prototypes, and we attempted to make the prototype designs as neutral as possible to avoid giving districts an incentive to configure their schools to take advantage of these new prototypes. Thus, in our first attempts to determine the resources for the new prototypes, we treated the elementary, middle and high school students as they would be treated in the separate elementary, middle and high school prototypes. Where staffing was the same across grade levels, we applied the same staffing rule for the entire enrollment.

In our discussions with the Professional Judgment Panel on small schools, however, it was pointed out that the teacher and pupil-support resources for middle and high schools were virtually the same, except that an additional counselor was provided for high schools. The Panel suggested that we eliminate the distinction between middle and high schools, and use the high school teacher staffing formulas for middle as well as high schools. *We concur with this proposal and the Select Committee voted to support this proposal at its August 23rd meeting.*

That decision simplified the resourcing formulas. Although we will show resources for middle and high schools throughout the report, teacher and pupil-support resources are the same for middle and high schools with the same ADM, except for schools with ADM at or below 105.

This decision also simplified how the K-8, K-12 and 6/7-12 prototypes would be resourced. The K-5 elementary ADM in any of these configurations would receive teacher and pupil-support resources as would that number of ADM for a regular elementary school prototype, and the 6-12 ADM would receive resources as would that number of ADM for a regular secondary school prototype. The schools would receive administrative, librarian aide, and per pupil resources appropriate for the elementary, middle and high school ADM. In the class size and small school sections below, we identify how these decisions pertain to very small schools as well. The result is that the new school prototypes cover the full range of school sizes and types in Wyoming.

RECALIBRATING THE PERSONNEL ELEMENTS IN THE WYOMING SCHOOL PROTOTYPES

The following sections discuss the personnel resources in the recalibrated, evidence-based prototype models: core teachers, specialist teachers, teachers for several at-risk programmatic interventions, substitute teachers and aides.

A1a. Core Teachers/Class Size

The current prototype models identify a class size for elementary, middle and high schools, but then in line 1 identify a total number of teachers sufficient to cover core teachers, specialist teachers and teacher resources for schools with an at-risk student concentration at the state average. This total does not make transparent the actual number of core teachers that derive from the class size norms, nor the actual number of specialist teachers, nor the extra teachers for at-risk services. Moreover, initially the "class size" label was not intended to suggest an actual class size but to serve as a way to calculate a number of teachers that would be used for core classes, specialist classes and at-risk services. Over time, however, the "class size" label has become an actual class size indicator, and both the Court and Wyoming practice is to have class sizes of 16 in elementary schools and 21 in secondary schools. This practice has also meant that there no longer are "extra" resources in the line 1 teacher numbers to provide services for the average incidence of at-risk students. The recalibration will make more transparent how the numbers of core and specialist teachers are determined, and it also will make more programmatic and specific recommendations for the number of teachers recommended to serve at-risk students.

Current Wyoming Block Grant. The current Wyoming Block grant provides teacher resources for class sizes of 16 in grades K-5, and for class sizes of 21 in grades 6-12.

The Evidence. Research on class size shows that **small classes in kindergarten through grade 3** have significant, positive impacts on achievement in mathematics and reading for all

students (Achilles, 1999; Gerber, Finn, Achilles & Boyd-Zaharias, 2001; Grissmer, 1999; Mishel & Rothstein, 2002; Molnar, 1999; Nye, Hedges & Konstantopoulous, 2002). Research has also concluded that the impact of small class size is even larger for students from low-income and minority backgrounds (Finn & Achilles, 1999; Krueger & Whitmore, 2001).

Over the past several years, different analysts have reached different conclusions on the role of class size on student achievement. In a late 1970s meta-analysis of the class size research, Glass and Smith (1979) concluded that class sizes needed to be reduced to around 14-17 students before an impact on achievement could be produced. However, in a re-analysis of that research, Odden (1990) noted that Glass and Smith had no sample studies of class sizes of 14-17 that actually improved student achievement, and that the Glass and Smith finding on class sizes of 14-17 was a statistical artifact that showed little, if any, impact of class sizes of any size until individual tutoring was provided.

However, research in the late 1980s and early 1990s provided new evidence of the impact of class size on achievement. The "gold" standard of educational (or any other impact) research is randomized experiments, which provide scientific evidence on the impact of a certain treatment (Mosteller, 1995). Thus, the primary evidence on the impact of small classes today is the Tennessee STAR study, which was a large scale, randomized experiment on class sizes of 14-17 for kindergarten through grade 3 (Finn and Achilles, 1999; Word, et al., 1990). The results showed that students in the small classes achieved at a significantly higher level (**effect size** of about 0.25 standard deviations) than those in regular class sizes, and that the impacts were even larger (**effect size** of about 0.50) for low-income and minority students (Achilles, 1999; Finn, 2002; Grissmer, 1999; Krueger, 2002; Krueger & Whitmore, 2001; Nye, Hedges & Konstantopulos, 2002). The same research showed that a regular class of 24-25 with a teacher

and an instructional aide did not produce a discernable positive impact on student achievement, a finding that undercuts the widespread practice of placing instructional aides in elementary classrooms (Gerber, Achilles, & Boyd-Zaharias, 2001).

Though some have argued that the class size impact was produced only in the Kindergarten years (Hanushek, 2002), that argument is only a conjecture since the experiment was for small class sizes for all of grades Kindergarten through grade 3.

Subsequent research showed that the positive impacts of the small classes in the Tennessee study persisted into middle and high school years, and even the years beyond high school (Finn, Gerger, Achilles & J.B. Zaharias, 2001; Krueger, 2002; Mishel & Rothstein, 2002; Nye, Hedges & Konstantopulos, 2001a, 2001b). Thus, although differences in analytic methods and conclusions characterize some of the debate over class size (see Hanushek, 2002 and Krueger, 2002), we – and Wyoming policy -- side with those concluding that small class size in elementary schools does make a significant, positive difference on student achievement.

Similar research with similar findings on the effect of class sizes of 15 for students in kindergarten through grade 3 was produced for Project Prime in Indiana (Chase, Mueller & Walden, 1986).

Two main mechanisms have been proposed through which class-size reduction effects may operate. Some have suggested that teachers may alter their instructional methods in smaller classes, making greater use of small groups, for example, or assigning more writing. However, several studies including those tied to Project STAR have failed to find consistent teaching differences related to class size (e.g., Betts & Shkolnik, 1999; Evertson & Randolph, 1989; Rice, 1999). A more likely operating mechanism is that students respond better to the same instruction in smaller classes. With fewer students per teacher, less time is needed for disciplinary matters

and students may be more engaged (Betts & Shkolnik, 1999; Finn & Achilles, 1999; Finn, Pannozzo & Achilles, 2003). Particularly in the early elementary grades, smaller classes facilitate forming social relationships among teachers, students, and their families that may be essential for school success.

Research on class size in secondary schools is harder to find, but the Wyoming policy of providing classes of 21 in middle and high schools is well within what might be considered best practice, and was recognized by the *Campbell II* court decision as a constitutional class size. Most comprehensive school reform models propose class sizes of 25 or smaller (Odden, 1997; Odden & Picus, 2000; Stringfield, Ross & Smith, 1996), and many professional judgment panels in other states have recommended secondary class sizes of 20 or 21 (see Appendix A).

Recommendation. We recommend that Wyoming retain its class sizes of 16 for grades K-5, and 21 for grades 6-12.

With these class size recommendations, a K-5 elementary school of 288 students (ADM) would receive 18.0 FTE core teacher positions. A middle school of 315 students would receive 15.0 FTE core content area teacher positions, and a high school of 630 students would receive 30 FTE core content area (mathematics, science, social studies, English, foreign language) positions. *We hasten to note that these core teachers would not be the only teaching staff in these schools. Several of the following sections recommend a variety of additional teachers for all school levels.* Below we offer details on how the proposed school prototype size and class sizes interact to allow for more efficient small school adjustments.

Elementary Schools: At the elementary level, the proposed prototype is 288 students. This is essentially the same size as the current elementary school prototype, but assumes full-time Kindergarten enrollments. With a class size of 16, a 288 student school would have an

average of 48 students for each of the grades (K-5), producing three class sections per grade. In Wyoming, this is often referred to as a three section school. A school with 192 students would have an average of 32 students per grade resulting in two classrooms for each grade – in Wyoming terms, a two section school. An elementary school with 96 ADM students would have an average of 16 students per grade, or 1 class section for each grade K-5. Under a prototypical model of 288 ADM and class size of 16, a 288 student school can generate and sustain three class sections at each grade level, and this figure can easily be prorated down to schools as small as 96 ADM and still offer a one unit school.

It is only when the student ADM drops below 96 that class sizes might need to be smaller to accommodate individual grade level classrooms. As a school's enrollment declines below 96 it seems logical that additional compensation for dis-economies of scale might be necessary. At the Professional Judgment Panel on Small Schools, held in Cheyenne on August 1, 2005, several panelists generally agreed that the resourcing model would work even for a school with an enrollment of 48 students (an average of eight students in each of grades K-5), with multi-age grouping of students in K-1, grades 2-3 and grades 4-5 classroom that would be the equivalent of half of a one section school. However, other panelists argued that elementary schools with ADM from 48 to 96 should receive at least six teachers, one for every grade level.

These options, including the multi-age approach for the 48 ADM school, are consistent with the elementary building standards developed by the School Facilities Commission, which is constructing three section, two section, one section schools as well as schools with either one or three classrooms.[11] A consequence of the former proposal is that a small school adjustment would only be made for elementary schools with enrollments below 48 ADM, although the

[11] Again, the School Facilities Commission should modify its standards to produce 1 kindergarten classroom in the 1 section, 2 K classrooms in the 2 section and 3 K classrooms in the 3 section schools, to accommodate the recommendation for full day kindergarten.

variation in staffing for schools with fewer than 96 students requires slightly higher per pupil resources than does the model with 96 or more ADM.

The following chart provides data on the number of elementary schools and their total enrollment in categories related to the pro-ration scheme described above. Under the current funding model, small school adjustments are made for all elementary schools with fewer than 288 students. As a result, over 18,500 elementary school children attend schools that qualify for the small school adjustment. The proposal above would limit the small school adjustment to the 49 schools with enrollments below 96 ADM. It would be very modest for schools with an ADM between 48 and 96, and would impact only 1,534 students nearly half of whom (747 students in 11 schools) are in schools with more than 48 students.

Elementary Schools by Number of Students

Size Category	Number of Schools	Total Enrollment
> 287	58	20,288
192-287	51	11,976
96-191	40	5,769
95-49	11	747
<49	38	787

Middle Schools: With 315 students, the prototypical middle school would have about 105 students per grade. If each teacher taught five class sections, with a class sizes of 21 the school would generate 15 core teachers under this proposal. This could be organized as three mathematics, three language arts, three science, three social studies and three foreign language (or other subject) teachers. A middle school with 210 students would generate 10 teachers (two math, two language arts, two science, two social studies and 2 foreign language/elective teachers). A middle school with 105 students would be provided five teachers (one math, one science, one language arts, one social studies and one foreign language/elective). For schools

with fewer than 105 students, a small school adjustment is required and discussed later in the report.

The chart below shows the number of middle/junior high schools at different ADM levels, both above and below the 315 student prototype. The current model makes small school adjustments for middle schools with fewer than 300 students. Although the chart below uses the prototype pro-rations based on a 315 student prototype, two of the schools in the 210 to 314 student category enroll between 300 and 314 students, which means that there are actually 23 schools with 13,969 students that currently do not receive a small school adjustment. Under the proposal, only the 26 middle schools with enrollments below 105, representing 1,264 students would receive small school adjustments.

Middle and Junior High Schools by Number of Students

Size Category	Number of Schools	Total Enrollment
> 314	21	13,352
210-314	6	1,628
105-209	12	1,723
< 105	26	1,264

High Schools: The situation for high schools is a bit more complex because high schools must offer a sufficient number of courses so all students have exposure to all the topics in the educational basket, including vocational education. We are quite confident that that high school prototype of 630 students and 30 teachers for class sizes of 21 students could be halved in size to 315 students with 15 teachers and still have sufficient teacher resources to provide courses sufficient to teach the educational basket. We have concluded that the formula would work for even smaller high school sizes, and raised this issue for discussion both at the Professional Judgment Panels that met in the first week of June 2005, and the Professional Judgment Panel on

Small Schools that met in Cheyenne on August 1, 2005. It appears that the staffing formulas will work for the high school of 210 students, but the degree to which an adjustment will be need for schools smaller than this, or smaller than 105 students, depends on conclusions regarding specialist teachers and the way instructional services are provided, both of which are addressed in subsequent portions of the report.

The chart below shows the number of high schools at different ADM levels above and below the 630 student prototype. Currently, the small school adjustment begins at 599 ADM. It includes 52 schools with 7,570 students (all of the schools in the rows labeled 315 -629 and below except for one high school with an enrollment of 626 students). Given the recommendations below, the small school adjustment for high schools will begin some place between 105 and 210 students, including at most 46 high schools with 5,147 students.

High Schools by Number of Students

Size Category	Number of Schools	Total Enrollment
> 629	15	15,081
315-629	7	3,049
100-314	22	3,815
< 100	24	1,332

The proposals above appear to offer a rationale for determining when a small school adjustment should be applied, something the Wyoming Supreme Court required in *Campbell II*.

Grouping students for instruction. Although the Professional Judgment Panels supported these class size recommendations, virtually every panel also raised several issues about how to calculate the number of teachers at an elementary school when the number of students was not so neatly divided by 16, particularly at each grade level for a school. For example, if an elementary grade had 16 students, a 1.0 FTE teacher position is provided. But panels asked what would happen if there were 17 students? Would that trigger an additional full FTE teacher, or just a

small fraction of an additional teacher? We responded that the formula would trigger just the additional fraction. Several panel members were not pleased with that response. Some panel members urged us to propose "rounding up" each calculation so that any small fraction would produce an additional 1.0 FTE teacher; this would allow an elementary school with 17 students to trigger 2.0 FTE teacher positions. But several panel members stated that that approach was too generous – that the additional teacher should be triggered at 19 or 20. We are concerned that approach would run into problems with the Supreme Court, which does not like so called "step" formulas, because the state would find it difficult to distinguish clearly between a grade with 19 students that triggered just 1.0 FTE teacher and a grade with 20 students that triggered 2.0 FTE positions. A formula that simply calculated FTE teachers to the nearest hundredth by dividing the ADM by 16 (or 21 for middle and high schools) would solve the "step" function problem but not the numbers of students in the class problem.

The issue here, as well as the 48-96 student elementary schools, is how students are grouped for instruction. If students are grouped by grade level, the fact that each grade level does not have a number of students evenly divided by 16 or 21 produces an issue of student placement and numbers of teachers. On the other hand, if schools adopt a multi-age approach, and in elementary schools, for example, create K-1, 1-2, 2-3, 3-4, and 4-5 classes[12] then it would be much easier to create classrooms of approximately 16 students, regardless of the specific number of students in each grade. This approach also would allow for differential placement of students according to their developmental progress, since it is a truism that there is great variability among elementary students in their academic development, a phenomenon that grade level grouping of students ignores.

[12] Or in the case of smaller schools, groupings such as K-1, 2-3 and 4-5.

Furthermore, research shows that multi-aging of students in elementary classrooms actually is better for students; students in **multi-age** classrooms achieve at least as much as students in age-grouped classes and often learn more with **effect sizes** ranging from 0.0 to 0.5 (Gutierrez & Slavin, 1992; Mason & Burns, 1996; Madon & Stimson, 1996; Pavan, 1992; Veenman, 1995). The reasons for increased student achievement are at least two fold. First, as just stated, classes can be organized so that the academic development of children in each class is more homogeneous thus allowing teachers to provide more whole group instruction, which allows teachers to provide more instruction to each student during each day. Second, if teachers stay with a student group over a two year time period, a process called "looping," then the teacher knows the student for the second year and less time as lost in starting the school year, determining how to organize and manage the class, and learning the academic achievement status of each student. Moreover, a recent report from the Rural School and Community Trust on school finance adequacy (Malhoit, 2005) lists the prevalence of multi-age classrooms in rural schools as one of several advantages that small, rural schools provide.

Multi-aging, though, works best if the teacher instructs the entire class as a group and essentially has a two-year curriculum that all students are taught over a two year time period. Multi-age classrooms run as "combination" or "multi-grade" classes, in which the teacher provides half a day of instruction for one grade, and instruction for the other half of the day to the other grade, can be a detriment to student learning, in part because each student might receive only a half day instead of a full day of instruction, with effect sizes ranging from -0.1 to zero. Panelists at several Professional Judgment Panels reported that this indeed was the way instruction was often provided in multi-grade or multi-age classrooms in Wyoming today.

Consequently, the way instruction is offered in multi-age classrooms impacts whether they are more or less effective for students.

The fact that multi-aging is an effective approach to grouping students for instruction, at least in the elementary grades, is reflected by some states "mandating" multi-age grouping of students, a practice in Kentucky, for example. Though we are not hinting that Wyoming should mandate multi-aging of students, we argue that such an approach is a very effective way to group students for instruction. Moreover, it addresses the fact raised by many of the professional judgment panels that the number of students in each grade divided by 16 or 21 is not whole number, thus making age-grouping of students problematic. We are suggesting that the best answer to this issue is multi-age grouping of students, not providing more teacher resources. Appendix B provides more information on the evidence of multi-age grouping of students, concluding that at worst it produces the same achievement result, but that if organized appropriately, can produce large, positive effects on student learning gains.

Some panelists stated that they did not "believe" in multi-age grouping of elementary students. Several Panelists at both the June Professional Judgment meetings and the August panel on small schools wondered whether multi-aging of students created problems with the new PAWS testing that requires students to take tests for their appropriate grade level each year beginning in the year in which they would be in grade 3. When we raised this issue with curriculum and testing leaders in the State Department of Education, they stated that multi-aging does not have to create such problems. In fact, they identified several small schools that had been multi-aging students for many years and had students taking the appropriate tests at the appropriate time. They also said the issue was a curriculum sequencing issue, so the teacher for a multi-age classroom would need to insure that a grade 2-3 multi-age class covered the requisite

grade 3 material so all third graders could take the grade 3 test over the course of the year, and likewise for 3-4, or 4-5 classrooms.

Recommendation: Thus, despite that fact that nearly all panels raised issues of whether to provide factional teachers, *we recommend that Wyoming calculate core teachers for elementary schools by dividing the school's ADM by 16; and for middle and high schools, by dividing the school's ADM by 21. Individual schools or districts would then be able to determine how to group students for instruction given the teacher resources this formula produces*. At its June 30-July 1, 2005 meeting, the Select Committee endorsed this position.

We also recommend that the standard class size of 16 teachers be used for elementary schools with enrollments down to 48 students. At its August 23rd meeting, the Select Committee voted to support a proposal for a minimum of six teachers for elementary schools with ADM between 48 and 96.

Additional recommendations for small schools are made in the small schools section below.

A1b. Specialist Teachers and Planning and Preparation Time/Collaborative Professional Development

Current Wyoming Block Grant. The current Wyoming Block grant provides for 2 FTE of these positions in the prototypical elementary school, 3.3 FTE positions in the middle school, and 4.8 FTE in the high school.

The Evidence. Teachers need some time during the regular school day for collaborative planning, job-embedded professional development, and ongoing curriculum development and review. Schools also need to teach art, music, library skills, physical education, health and safety, and applied technology, among others. Requiring core teachers to teach only five of six periods a day and having specialist teachers teach the specialist subjects during those periods, is

the most straight forward way to accomplish these twin and linked objectives. Providing each teacher one period a day for collaborative planning and professional development focused on the school's curriculum requires an additional 20 percent allocation of teachers to those needed to provide the above class sizes. This formula assumes middle and high schools offer a six period day with each teacher teaching five periods, a design standard that fits with increasing the number of core teachers by 20 percent for specialist subjects. These teachers could teach the above or other specialist content classes.[13]

The current middle and high school prototypes assume a seven period day for which teachers provide instruction for 6 periods. This would only require an additional 17 percent of specialist teachers and is covered by the proposal for 20 percent specialist teachers in our recommendations. However, some districts organize middle and high schools into seven periods, with teachers teaching only 5 periods. This would require an additional 40 percent of specialist teachers, which is not funded under the 20 percent proposal above. In addition, some high schools are organized into four, 90 minute "block" schedules, with teachers providing instruction for three of the blocks, and having a 90 minute planning and preparation period. If specialists are used during the planning time periods, this approach to block scheduling would require an additional 33 percent of specialist teachers, or larger class sizes. Secondary schools using these latter two approaches usually increase class sizes modestly in order to have sufficient resources to fully staff their school schedule.

We conclude that staffing formulas providing for an additional 20 percent specialists can work adequately even for small schools down to the 48 student elementary, 105 student middle - and 210 student high school. There are at least two ways such small districts can hire and use

[13] This formula is consistent with the standards being used by School Facilities Commission to build middle and high schools; indeed, the building standards are sufficient to allow adequate space for all the following scheduling configurations.

specialist teachers. One is to use teachers certified K-12 in art, music and physical education, to provide instruction at all three levels of schools – elementary, middle and high. Another is to find teachers who have two certifications or endorsements on a main certification, such as math and science, English and art, physical education with a health endorsement, etc. An additional strategy, which could be used only if individuals were available in the community, would be to hire part-time teachers for the specialist areas.

We should also note that the primary way to provide job-embedded professional development (a key effective feature of professional development that is discussed more fully in Section G below) is to provide for and use a significant portion of planning and preparation time within the normal school day for this purpose (see Odden and Archibald, 2001 for examples). This means that the planning and preparation time needs to be provided as 45-60 minutes of uninterrupted time, not 15-30 minutes at different times during the day. Effective professional development should provide between 100 and 200 hours of professional development annually for each teacher (we would recommend closer to 200 hours), include extensive coaching in the teacher's classroom (provided by the site-based instructional facilitators/coaches/mentors discussed below), include all faculty and administrators in a school, focus heavily on the content and curriculum that each teacher teaches, and be aligned with state/district content standards and student tests (Birman, Desimone, Porter & Garet, 2000; Cohen & Hill, 2001; Desimone, Porter, Garet, Yoon, & Birman, 2002, Desimone, Porter, Birman, Garet & Yoon, 2002; Garet, Birman, Porter, Desimone & Herman, 1999). Again, we expand on the structure and resources needed for effective professional development in Section G below.

Recommendation. We recommend providing an additional 20 percent of the core teachers in each of the prototypical elementary, middle and high schools in order to teach

specialist classes and also provide time for teachers to engage in collaborative planning and preparation as well as job-embedded professional development during the period when they do not teach. The 20 percent formula provides an additional 3.6 FTE positions for the prototypical 288 student elementary school, 3.0 FTE positions in the prototypical 315 student middle school, and 6.0 positions in the prototypical 630 student high school.

In totaling the core plus the specialist teachers from the recommendations above, our recommended total teaching staff for prototypical schools are 21.6 elementary, 18 middle and 36 for the prototypical high school. This is modestly larger than the current prototypes. The major difference is for the elementary schools for which the recommendation provides slightly more specialist teachers so all elementary teachers have a full period of planning and preparation each day.

Professional Judgment Panel comments. Just as this issue lead the Select Committee into a discussion of various school schedules, and various numbers of daily class periods and teachers' instructional responsibilities, similar issues and discussions emerged in all of the Professional Judgment Panels. It became clear in the course of our meetings with the professional judgment panels that very few middle and high schools had a 6 period day with teachers providing instruction for 5 of those periods. Most schools had a 7 period day, many had 8 period days, and some had the Block Schedule with each of four blocks lasting 90 minutes and teachers teaching three blocks a day.

The major reason given for the 7 and 8 period day was the belief it was the only way a school could teach the education basket, provide the range of elective courses that schools believed students should have available to them and provide sufficient courses to meet *district* high school graduation requirements. Many schools, particularly high schools, believed that the

6 period day would not allow them adequate opportunity to provide sufficient vocational education programming. Further, many high schools, even small high schools, wanted to provide more than the minimum two vocational education programs, and most did – particularly when business courses with word processing and life sciences were included. Indeed, all panels felt pressure from the state, largely through the Body of Evidence requirement for high school graduation, to provide a range of elective and vocational education programs, a pressure that compelled them to organize 7 and 8 period days.

Although there was some discussion, reflected in the above paragraphs, that providing more electives was not the best route to having students perform at higher levels in the core subjects of reading/English/language arts, mathematics, science and history, panelists nevertheless claimed that the state was increasing pressure to expand electives. One panel agreed that this state pressure was at odds with NCLB pressure for greater student performance in the above four core subjects, and that perhaps a reduction in the push for more electives would be a route to focus more on the core subjects and not have a 7 or 8 period day.

But all panels felt the pressure for more electives and for more vocational education programming. Responding to these pressures, moreover, led to a request for more specialist teachers – particularly at the high school level, as the ability to offer electives and more than two vocational education programs could not be accommodated *easily* with the proposed 20 percent formula for specialist teachers. The panels provided us with several examples of schools that had 7 period days in which teachers were required to teach for 5 periods. Panelists also convinced us that for the 105 student middle and high school prototypes, a minimum of two specialist teachers (which is 40% more than the core teachers for those sizes) was needed to provide instruction to meet the current minimum curriculum offering requirements, though other

panelists, particularly members of the Panel on small schools, argued that 4 specialist teachers were needed in addition to 5 core teachers.

In addition, many panel members argued that at the high school level the Educational Basket should be more rigorous, demanding 4 years of instruction in all four core areas (English, math, science, social studies) as well as providing resources to offer several electives, including vocational education. This approach, especially requiring four core subject courses for each year of high school, would help emphasize the importance of teaching all students to higher performance levels in these academic areas.

For all these reasons, *the Panels recommended that the Select Committee consider having the specialist teacher formula support 40 percent of core teachers for middle and high schools rather than the 20 percent we describe and recommend above.* Thus the question facing the committee was whether to agree with the desire to provide more electives and vocational education – and to de-emphasize the preference for elective and focus more on the core subject areas.

We should note that combined with the formula for core academic teachers, the 40 percent formula recommended by the professional judgment panels would provide more teacher resources for all schools. This would help schools accomplish five objectives:

1. Allow schools to go beyond the minimum academic requirements of the Education Basket, a desire of many panelists.
2. Allow schools more flexibility to provide class sizes closer to the 16 and 21 figures given the variability in actual student enrollments.
3. Allow schools to provide more elective and vocational education courses.

4. Provide enough additional teaching resources in terms of the sum of core and specialist teachers to enable schools to offer more advanced academic classes even when enrollments for those courses are below 21.
5. Allow the formulas for core and specialist teachers to "work" for prototypical schools down to 105 middle and high school students.

It also is true that a 40 percent specialist teacher formula fully funds a 6/5, 7/6, 7/5 8/6 and 4/3 Block Schedule. It provides enhanced flexibility to teach more academic courses at the high school and middle school and allows high schools and even middle schools to offer more elective and vocational courses. Though different schools would use these teachers in different ways to address these issues, given the multitude of issues raised by the various panels, this specialist teacher formula modification would be a straightforward and effective way to accommodate all of these concerns while maintaining the tradition of local control that is so important to Wyoming education.

However, this approach would double the costs of providing for planning and preparation time in middle and high schools and for providing instruction in elective and non-core subjects. We are confident that 20 percent formula is adequate. Moreover, the 20 percent formula would implicitly retain a strong focus on core subjects. Consequently 20 percent is the approach we recommend, but with modifications discussed below

Again, as the panelists noted, a 40 percent formula for the number of specialist teachers is that the formula might provide sufficient teacher resources for all secondary schools with ADM of 105 or above at the middle and high school level. This would eliminate the need for a small school adjustment for staffing at enrollment levels exceeding these prototype sizes, and would provide a rationale (requested by the Court in *Campbell I*) for the use of small school

adjustments for schools with fewer students. But it must be noted that this goal can also be accomplished by a simple requirement that for secondary school sizes down to 105 students, a minimum of two specialist teacher positions be provided.

At the June Professional Judgment Panels, many agreed with a proposal that a high school of 105 students needed a minimum of 7 teachers: 1 math, 1 science, 1 social studies, 1 English/language art, 1 physical education/health, 1 art/music, and 1 vocational/career, with foreign language provided via a WEN video. To be sure, they stated that this was a bare minimum, but that it could work. The staffing formula of 1 teacher for every 21 students (5 for a high school with 105 students) plus a minimum of two specialist teachers produces this number of teachers. But at the Professional Judgment Panel on Small Schools held in Cheyenne on August 1, 2005, several of those who attended argued that eight or nine teachers were needed, and were not enthusiastic about having a WEN video, or other distance-education or Internet-based course, replace teachers.

Summary of recommendations: We recommend that specialist teachers be provided at the rate of 20 percent of core teachers, with a minimum of two in secondary schools. At the August 23rd meeting, the Select Committee approved the use of the 20 percent specialist formula along with providing a minimum of 9 total teachers (core plus specialists) in small high schools, and a minimum of seven in small middle schools. For secondary schools with fewer than 49 students an alternative formula described below was approved. The nine teacher minimum will provide adequate teacher resources until a high school enrollment reaches 158 students.

A1c. Instructional Facilitators/School-Based Coaches/Mentors

Current Wyoming Block Grant. There is no provision for school-based instructional coaches in the current Block Grant, except possibly for some staff in the Reading Assistance and Intervention Program.

The Evidence. Most comprehensive school designs, and the Evidence-Based studies conducted by the lead researchers in Kentucky (Odden, Fermanich & Picus 2003), Arkansas (Odden, Picus & Fermanich, 2003), and Arizona (Odden, Picus, Fermanich & Goetz, 2004), call for **school-based instructional facilitators or instructional coaches** (sometimes called mentors, site coaches, curriculum specialists, lead teachers). The technology intensive designs also require a technology coordinator (see Stringfield, Ross & Smith, 1996). Further, several designs suggest that while one facilitator might be sufficient for the first year of implementation of a school-wide program, in subsequent years an additional 0.5 to 1.0 FTE facilitator is needed. Moreover, the technology designs recommend a full-time facilitator who spends at least half-time as the site's technology expert. Thus, drawing from all programs, we conclude that about 2.5 FTE instructional facilitators/technology coordinators are needed for each school unit of 500 students. This resourcing strategy works for elementary as well as middle and high schools.

These individuals would coordinate the instructional program but most importantly would provide the critical ongoing instructional coaching and mentoring that the professional development literature shows is necessary for teachers to improve their instructional practice (Garet, Porter, Desimone, Birman, &Yoon, 2001; Joyce & Showers, 2002). This means that they spend the bulk of their time in classrooms, modeling lessons, giving feedback to teachers, and helping improve the instructional program. We expand on the rationale for these individuals in our section on professional development (Section G below), but include them here as they

represent teacher positions. The technology staff would provide the technological expertise to fix small problems with the computer system, install all software, connect computer equipment so it can be used for both instructional and management purposes, and provide professional development to embed computer technologies into the curriculum at the school site.

The impact of coaches as part of the professional development program is very large. Joyce and Calhoun (1996) and Joyce and Showers (2002) found that when teachers had sufficient time to engage in professional development that was embedded in classrooms with the aid of instructional coaches, teacher practice changed significantly, with effect sizes of 1.68 in the transfer of training to classrooms, 1.25 for skill-level objectives, and 2.71 for knowledge-level objectives. Effects were almost negligible without the classroom based coaching.

Recommendation. We conclude the evidence suggests allocating 2.5 FTE instructional coaches for a school of 500 students. This would translate into 1.5 FTE facilitators for the 288 ADM prototypical elementary school, 1.5 FTE facilitators for the 315 ADM middle school, and 3.0 FTE facilitators for the 630 ADM high school. This formula produces a 0.5 facilitator for the 96 ADM elementary and 105 ADM secondary school, and the small school adjustments proposed later handle resources for schools with students below those numbers.

Although these positions are identified here as FTE slots, schools could divide the services across several individual teachers. For example, the 1.5 positions in elementary schools could be structured for three Master Teachers under the TAP program, with each teacher/instructional facilitator providing instruction 50 percent of the time, and functioning as a curriculum coach in reading, mathematics or technology for 50 percent of the time. The same allocation of functions across individuals could work for the middle and high schools.

Appendix C outlines the full costs for implementing the TAP program in a school of 500 students. Their estimated cost is about $425/pupil, but their cost estimates understate the full cost of teacher FTEs so we would put their cost figure closer to $500/pupil. However, the largest cost item – Master Teachers – is covered by the instructional facilitator recommendation, and a second cost item – specialist teachers, are covered by recommendations above for specialist teachers. That means that the major costs for TAP are the salary augmentation for Master Teachers, which they recommend as $8,000 per Master, the salary augmentations for Mentor Teachers, which they recommend as $4,000 per Mentor, and their bonus pool of $2,500 per teacher in a school that qualifies. Assuming Wyoming implements the instructional facilitator and specialist recommendations in the report, that would mean the TAP program cost would be about $205/pupil, with all of that being salary incentives.

Further, as the state creates instructional facilitator positions, it also would need to consider how to ensure that the individuals would receive the needed training for the knowledge and skills needed to deploy these new instructional coaching roles effectively.

A2. Services for At-Risk Students

This section outlines an integrated and sequenced set of cost-based programmatic recommendations for at-risk students, including Limited English Speaking (LES) or English Language Learning (ELL) students. The recommended services include tutoring, extra services for ELL students, extended day programs, summer school programs and alternative schools for secondary students needing a program outside of the regular school structure.

Current Wyoming Block Grant. The current Block Grant provides extra funds for "at-risk" students. At-risk students are referred to as the "unduplicated" count and until recently equaled the sum of the number of students eligible for free and reduced price lunch PLUS the

number of Limited English Speaking (LES) or English Language Learning (ELL) students (who were not also eligible for free and reduced price lunch). Because Sommers (2003) found that this count underestimated the at-risk student numbers in middle and high schools, the 2004 Legislature passed a law requiring that the number of "mobile" students (as determined by WyCAS data) be added to the unduplicated count to determine the number of at-risk students for middle and high schools.

The extra funds are calculated on the basis of an adjustment for all at-risk students, times the base pupil amount in the Block Grant. The adjustment is the product of a multiplier and 0.25, which is the at-risk student weight for schools whose at-risk student population exceeds 75 percent of all students. The adjustment drops by a multiplier that declines from 1.0 for a school with an at-risk concentration of 75 percent or more to 0.175 for a school with an at-risk concentration of 30 percent, which was just above the state average of about 29 percent. No additional funds flow to schools whose at-risk student population is at or less than the statewide average. The per pupil adjustment for various concentrations of at-risk students is shown in Chart 2 (assuming a basic Block Grant per pupil amount of about $8,000).

At-risk students in the 30-35 percent band produce an additional $350 per at-risk student, in the 35-40 percent band produce an additional $700 per at-risk student, etc. The funds are intended to fund all relevant programs for at-risk students.

Chart 2
Current At-Risk Funding Formula

At-Risk Concentration Level	Multiplier	Product	Amount Per At-Risk Pupil by At-Risk Concentration (assuming basic block grant per pupil amount is $8,000)
30 percent	0.175	0.04375	~$350
35 percent	0.350	0.0875	~$700
40 percent	0.45	0.1125	~$900
45 percent	0.55	0.1375	~$1,100
55 percent	0.65	0.1625	~$1,300
65 percent	0.85	0.2125	~$1,700
75 percent	0.95	0.2375	~$1,900
> 75 percent	1.00	0.25	~$2,000

Source: MAP model 4.2
http://legisweb.state.wy.us/2005/interim/schoolfinance/schoolfinance.htm

We recommend dropping this complicated dollar formula and replacing it with a series of cost-based, programmatic interventions for at-risk students. Below we provide a rationale for tutors, programs for ELL students, for extended day programs, for summer school, and finally for Alternative secondary school programs. We should note at this point that not all at-risk students will need all services, and this fact partially determines how we estimate need.

A2a. Tutors

Evidence. Wyoming has altered its adjustments for at-risk students over the years. In 1998, it was argued that the teacher resources in the Block Grant were sufficient to address the extra needs of the bulk of at-risk students, and an extra allocation of $500 per free and reduced price lunch student was provided but only to schools whose concentration of such students exceeded 150 percent of the state average (about 45 percent with the state average at 30 percent). This "threshold" approach was found unconstitutional by the courts. At one point, the state also added an adjustment for LES students; the adjustment was to count LES students as 1.15 ADM when the LES student count exceeded 20 students per grade or 25 percent of the ADM in a

school. The court also found that adjustment to be unconstitutional in part because of the non-substantiated and thus allegedly arbitrary cut-off.

In 2002, these formulas were changed to the sliding-scale formula described above, and the free and reduced price pupil count was augmented to include LES students who were not also eligible for free and reduced price lunch, hence the "unduplicated" count.

In two subsequent research studies, Sommers (2002, 2003) assessed the degree to which the unduplicated count accurately estimated the number of at-risk students in each school, as well as the degree to which the dollars produced allowed districts and schools to provide extra services of sufficient quality for all at-risk students. She found that these research goals were difficult to accomplish both because districts defined at-risk students very differently, as there was no standard state definition, and because programs provided to address the extra needs of at-risk students varied tremendously in type, breadth and depth.

However, Sommers did conclude that while the unduplicated count quite accurately estimated the numbers of at-risk students in elementary schools, it somewhat underestimated such students in middle schools, and substantially underestimated such students in high schools, mainly because fewer students apply for free and reduced price lunch in secondary schools. To remedy this underestimation, she proposed adding the number of mobile students (students who were new to the school) times 0.53 to the unduplicated count for middle schools, and the number of mobile students (students who were new to the school) times 0.75 to the unduplicated count for high schools. Following this recommendation, the 2004 Wyoming legislature required that the total number of mobile students be added to the unduplicated count to determine the number of at-risk students in middle and high schools. We concur with these legislative changes and agree that these counts of "at-risk" students are good, comprehensive indicators of the number of

at-risk students in each school (Sommers, 2002, 2003). The state should develop a more standard and accurate procedure for identifying mobile students, but for now these pupil counts are "good enough" to augment the unduplicated count to estimate the number of at-risk students to use in the state funding formulas.

Because not all students will learn to performance standards with just the core instructional program, districts and schools should design a **powerful** sequence of additional **effective strategies for at-risk or struggling students**, *i.e.*, students who must work harder and who need more time and help to achieve to the state standards. Rather than simply provide a pot of dollars, the state's current approach, we recommend a series of specific, cost-based extra-help programs for at-risk students:

- Tutoring, i.e., immediate, intensive assistance to keep at-risk students on track
- Sheltered English and ESL instruction for ELL students
- Extended day programs
- Summer school for at-risk students still needing extra help to achieve to state standards
- An Alternative school mainly for secondary students who need an environment outside of the regular school structure to succeed.
- Continued 100 percent cost reimbursement for special education.
- Finally, we also note that we propose to increase pupil support resources as the numbers of at-risk students in a school increases.

The most powerful and effective strategy to help at-risk students meet state standards is individual one-to-one tutoring provided by licensed teachers (Shanahan, 1998; Shanahan & Barr, 1995; Wasik & Slavin, 1993). Students who must work harder and need more assistance to achieve to proficiency levels (i.e. students who are ELL, low income, mobile, or have minor

disabilities) especially benefit from preventative tutoring (Cohen, Kulik, & Kulik, 1982). Tutoring program effect sizes vary by the components of the approach used, e.g. the nature and structure of the tutoring program, but **effect sizes** on student learning reported in meta-analyses range from **0.4 to 2.5** (Shanahan, 1998; Wasik & Slavin,1993; Cohen et al., 1982; Mathes & Fuchs, 1994; Shanahan & Barr, 1995), with an average about 0.75 (Wasik & Slavin, 1993).

The theory of action for why individual one-to-one tutoring, as well as other very small student groupings, boosts student learning is as follows. First, tutoring intervenes immediately when a student is trying to learn. Second, tutoring is explicitly tied to the specific learning problem. Third, when provided by a trained professional, tutoring provides the precise and appropriate substantive help the student needs to overcome the learning challenge. Fourth, tutoring should thus remedy short-term learning problems, and in many cases may not be needed on a continuing basis. In short, though potentially expensive, the ability of tutoring to intervene quickly, precisely and effectively to undo an individual's specific learning challenge gives it the ability to have large effects, particularly when the specific learning challenge or challenges are key concepts to a student's learning the grade level expectations for a specific content area.

The impact of tutoring programs depends on how they are structured. The alignment between what tutors do and the regular instructional program is important (Mantzicopoulos et al., 1992; Wheldall et al., 1995). Who conducts the tutoring matters, as does the intensity of the tutoring (Shanahan, 1998). Poorly organized programs in which students lose instructional time moving between classrooms can limit tutoring effects (Cunningham & Allington, 1994). Researchers (Cohen, Kulik, & Kulik, 1982; Farkas, 1998; Mathes & Fuchs, 1994; Shanahan, 1998; Shanahan & Barr, 1995; Wasik & Slavin, 1993) have found greater effects when the tutoring includes the following mechanisms:

- Professional teachers as tutors
- Tutoring initially provided to students on a one-to-one basis
- Tutors trained in specific tutoring strategies
- Tutoring tightly aligned to the regular curriculum and to the specific learning challenges, with appropriate content specific scaffolding and modeling
- Sufficient time provided by the tutor
- Highly structured programming, both substantively and organizationally.

We note several characteristics of an effective tutoring strategy. First, each tutor would tutor one student every 20 minutes, or three students per hour. This would allow one tutor position to tutor 18 students a day. (Since tutoring is such an intensive activity, individual teachers might spend only half their time tutoring; but a 1.0 FTE tutoring position would allow 18 students per day to receive one – to – one tutoring.). Three positions would allow 54 students to receive individual tutoring daily in the prototypical elementary and middle schools. Second, most students do not require tutoring all year long; tutoring programs generally assess students quarterly and change tutoring arrangements. With modest changes such as these, nearly half the student body of a 300 pupil school unit could receive individual tutoring some time during the year. Third, not all students who are at-risk require individual tutoring, so a portion of the allocation could be used for students in the school who might not have the at-risk indicator but nevertheless might have a learning issue that could be remedied by tutoring.

Though we have emphasized *individual* tutoring, schools could deploy these resources provided for intensive intervention in evidence-based ways other than just individual tutoring. In a detailed review of the evidence on how to structure a variety of early intervention supports to prevent reading failure, Torgeson (2004) shows how one-to-one tutoring, one-to-three tutoring,

and one-to-five small group sessions can be combined for different students to enhance their chances of learning to read successfully. One-to-one tutoring would be reserved for the students with the most severe reading difficulties, scoring say, at or below the 20th or 25th percentile on a norm referenced test. Intensive instruction for groups of three-to-five students would then be provided for students above that level but below the proficiency level.

The instruction for all groupings, though, needs to be more explicit and sequenced than that for other students. Young children with weakness in knowledge of letters, letter sound relationships and phonemic awareness need explicit and systematic instruction to help them first decode and then learn to read and comprehend. As Torgeson (2004: 12) states:

> Explicit instruction is instruction that does not leave anything to chance and does not make assumptions about skills and knowledge that children will acquire on their own. For example, explicit instruction requires teachers to directly make connections between letters in print and the sounds of words, and it requires that these relationships be taught in a comprehensive fashion. Evidence for this is found in a recent study of preventive instruction given to a group of high at-risk children in kindergarten, first grade and second grade …..only the most [phonemically] explicit intervention produced a reliable increase in the growth of word-reading ability … schools must be prepared to provide very explicit and systematic instruction in beginning word-reading skills to some of their students if they expect virtually all children to acquire work-reading skills at grade level by the third grade …. Further, explicit instruction also requires that the meanings of words be directly taught and be explicitly practiced so that they are accessible when children are reading text …. Finally, it requires not only direct practice to build fluency …. but also careful, sequential instruction and practice in the use of comprehension strategies to help construction meaning.

Torgeson (2004) goes on to state that meta-analyses consistently show the positive effects of reducing reading group size (Elbaum, Vaugh, Hughes & Moody, 1999) and identifies experiments with both one-to-three and one-to-five teacher-student groupings. While one- to-one tutoring works with 20 minutes of tutoring per student, a one-to-three or one-to-five grouping requires a longer instructional time for the small group – up to 45 minutes. The two

latter groupings, with 45 minutes of instruction, reduced the rate of reading failure to a miniscule percentage.

A one FTE tutoring position could tutor 30 students a day in the one-to-three setting with 30 minutes of instruction per group, and 30+ students a day in the one-to-five setting with 45 minutes of instruction per group. Three FTE tutoring positions could then provide this type of intensive instruction for up to 90 students daily. In short, while we have emphasized one-to-one tutoring, and some students need one-to-one tutoring, other small group practices can also work, with the length of instruction for the small group increasing as the size of the group increases. And the interventions only help students to learn to read if they provide the type of explicit instruction described above.

While Torgeson (2004) states that similar interventions can work with middle and high school students, the effect, unfortunately, is smaller as it is much more difficult to undo the lasting damage of not learning to read when students enter middle and high schools with severe reading deficiencies.

Overall, tutoring program **effect sizes** vary by the components of the approach used, e.g. the nature and structure of the tutoring program, but effect sizes on student learning reported in meta-analyses range from **0.4 to 2.5** (Shanahan, 1998; Wasik & Slavin,1993; Cohen et al., 1982; Mathes & Fuchs, 1994; Shanahan & Barr, 1995), with an average about **0.75** for one-to-one tutoring programs based on an meta-analysis of sixteen one-to-one tutoring programs (Wasik & Slavin, 1993).

Recommendation. An important issue is how many tutors to provide for schools with differing numbers of at-risk students. The standard of many comprehensive school designs is a ratio of one fully licensed teacher-tutor for every 100 students in poverty or "at-risk", with a

minimum of one for every prototypical school. Thus, we recommend providing one FTE tutor position for every 100 Wyoming at-risk students, with a minimum of one for the prototypical 288 student elementary and 315 student middle or high school. Using the Wyoming "at-risk" student count, this standard would provide from one to three professional teacher-tutor positions for the proposed prototypical elementary and middle schools, and up to six for the 630 student high school.

Given all of the above recommendations, we want to note at this point the multiplicity of recommendations ***so far*** focused on getting students to read proficiently by the end of the third grade and to perform at proficiency levels after that. These recommendations include the following:

- Full-day kindergarten
- Classes of 16students for the first four years of school, K-3
    - Perhaps even smaller classes if schools had all licensed staff in an elementary school teach reading during a 90 minute reading block
- Hopefully at least 90 minutes of regular reading instruction daily
- An Evidence-Based reading curriculum, with a balance of phonics, phonemic development, writing and comprehension
- More effective teachers with access to rigorous professional development
- Individual and small group tutoring if all of the above still leave the student struggling.

In sum, our initial recommendations for immediate and intensive extra help for at-risk students struggling to learn to standards comes "after" a series of other Evidence-Based strategies in the base Block Grant, all designed and proposed to help the student learn to proficiency.

As is clear below, these strategies are further augmented by some additional services for ELL students, extended-day programs, summer school for at-risk students who need even more help to learn to state standards, alternative school programs, additional assistance for disabled students, and extra pupil support and parent outreach resources based on at-risk student counts.

A2b. English Language Learning (ELL) or Limited English Speaking (LES) Students

Current Wyoming Block Grant. Limited English Speaking (LES) students are included in the unduplicated count of at-risk students and trigger the extra funds according to the at-risk formula described above.

The Evidence. Next to providing extra teachers for English as a second language instruction to students for whom English is not their primary language, research shows that ELL students need a solid and rigorous core curriculum as the basis from which to provide any extra services. For example, a recent study of what is needed to help English language learners achieve to high performance standards (Gandara, Rumberger, Maxwell-Jolly, & Callahan, 2003) suggested that what is in the core or base program is critically important. That study concluded that LES students need:

- Qualified teachers – a core goal of all the recommendations in the report
- Adequate instructional materials and good school conditions, now included in each prototypical school model
- Good assessments of ELL students so teachers know in detail their English language reading and other academic skills, and less segregation of ELL students; recommendations for high quality assessment of ELL students have been made by previous reports in Wyoming

- Rigorous curriculum and courses for all ELL students, and affirmative counseling of such students to take those courses
- Professional development for all teachers, focusing on sheltered English teaching skills.

Research shows that it is the English language learners from lower income, and generally less educated, backgrounds who struggle in school and need extra help. Triggering tutoring resources on the basis of the economic background of students as previously recommended would provide most of the extra help resources needed for struggling English language learners while having a minimal effect on costs because the ELL numbers do not add many students to the unduplicated count. However, research, best practices and experience also show that when students are both from a low-income background and English language learners, some additional assistance is needed that include some combination of small classes, English as a second language classes, professional development for teachers to help them teach "sheltered English classes, and "reception" centers for districts with large numbers of ELL students that arrive at different times during the school year.

In a best-evidence synthesis of 17 studies on bilingual education, Slavin & Cheung (2005) found that ELL students in bilingual programs outperformed their non-bilingual program peers. Using studies focused primarily on reading achievement, the authors found an **effect size** of **+0.45** for ELL students.

Recommendation on ELL. Our previous research found that providing an additional 0.4 FTE position for every 100 ELL students was sufficient for these important additional services. Thus we initially recommended providing 0.4 FTE positions for every 100 ELL students, *in addition to* the tutoring resources recommended above.

However, both Professional Judgment Panels in Rock Springs urged that our ELL formula be changed from an additional 0.4 to an additional 1.0 FTE for each 100 ELL students. School districts represented in the Rock Springs panels had the highest incidence of ELL students in their schools, claiming that in some instances ELL students represented 30 to 40 percent of a school's enrollment. In an especially informative interaction with the superintendent and middle school principal from Teton County, we learned that, during the school's 7 period daily schedule, it was providing ESL, i.e., English as a second language, class to its ELL students instead of an alternative, elective class offering. Although initially, we believed that strategy did not require any additional resources – ELL students were simply taking an ESL class (yes, the teacher needed ESL skills) rather than another class – we came to understand that additional resources for this strategy were necessary. Because the district has determined that the ELL students were best served through three levels of ESL classes (each taught during a different period of the day), enrollment in any one of those classes was insufficient to enable the school to reduce the number of non-ESL classes in that time slot. Instead, between two and four ELL students were pulled from each class. ESL classes were organized to accommodate the number of students requiring service, and additional teacher resources were needed to meet this need.

Although there may be the potential to cancel some classes if sufficient numbers of the same class have sufficient numbers of ELL students pulled out, it was generally agreed that if the ELL formula were changed to trigger an additional 1.0 FTE position for every 100 ELL students, the staffing resources would be sufficient to allow the provision of the ESL classes. We concurred with that recommendation. We should note that this school was providing structured English immersion for all ELL students, with ESL as an additional course, and not a bilingual education program. The school viewed that service strategy as a state-of-the-art approach. Thus,

the pull-out class provided ELL students with an additional "dose" of English instruction, reinforcing the key goal of the program as having the ELL students learn English so they could continue their schooling in English language instruction classrooms.

Thus, we recommended that the ELL formula be changed from our initial recommendation of providing an additional 0.4 FTE to providing an additional 1.0 FTE for every 100 ELL students. At its June 30-July 1, 2005 meeting, the Select Committee concurred with this recommendation.

We hasten to note that these are not the only resources provided for ELL students. All ELL students are included in the at-risk counts, which trigger tutoring, extended day and summer school resources (see following discussion), so all of these resources would be available for ELL students as well. For example, if a 100 at-risk count were comprised of just free and reduced price lunch and no ELL students, it would trigger 1.0 tutor position, plus the extended day and summer school resources below. But if the 100 at-risk student count consisted of just ELL students, it would trigger the initial 1.0 tutor position, *plus an additional 1.0 tutor position*, as well as the extended day and summer school resources below.[14] Thus, because the Wyoming at-risk student count includes all ELL students, this element of our at-risk proposal simply ensures that *more* resources are provided when those at-risk students are ELL, allowing an even fuller array of services to be provided.

A2c. Extended-day programs.

Current Wyoming Block Grant. There is no explicit provision for extended school days in the current Wyoming Block grant. Dollars from the at-risk adjustment can be used for this purpose, but there is no explicit funding for extended-day programs.

[14] In both instances the 100 students would also generate one FTE pupil support position as well.

The Evidence. Beginning in elementary school and particularly in secondary schools, after-school or extended-day programs might be necessary for some students. After-school programs are created to provide a safe environment for children and adolescents to spend time after the school day ends, as well as to provide academic support. In a review of research, Vandell, Pierce and Dadisman (2005) found that well designed and administered after-school programs yield numerous improvements in academic and behavioral outcomes (see also, Baker & Witt, 1996; Dishion, McCord, & Poulin, 1999; Mahoney, Stattin, & Magnusson, 2001; Posner & Vandell, 1994; Schinke, Cole, & Poulin, 2000; Tierney, Grossman, & Resch, 1995; White, Reisner, Welsh, & Russell, 2001).

Several recent experimental studies have documented the potential of extended-day programs. Cosden et al. (2001) found that the Gervitz Homework Project improved sixth grade SAT-9 math and reading scores for participants in the high-program attendance group versus those in the low-program-attendance group, though a third of the control group participated in other after-school programs and over half the program students dropped out. Philliber et al. (2001) found that the Children's Aid Society Carrera-Model Teen Pregnancy Prevention Program produced significantly higher PSAT scores for program versus control youth. An evaluation of the Howard Street Tutoring Program (Morris, Shaw, & Perney, 1999) claimed significant differences between the treatment and control group in gains on basal word recognition, basal passages, and two measures of spelling. Lastly, an evaluation of the Quantum Opportunities Program (Hahn et al., 1994; Lattimore et al., 1998) found that program members were much more likely than control group members to have graduated from high school and to be in a post-secondary school. The rate of four-year college attendance among members was more than three times higher than the control group rate and their rate of two-year college

attendance was more than twice as high. After two years, experimental group average scores for five of the 11 academic functional skills were significantly higher than control group scores. On the other hand, the 21st Century Community Learning Centers (CCLC) Program study evaluation (Dynarski et al., 2003), though hotly debated, indicated that for elementary students, programs did not appear to produce measurable academic improvement. But critics of this study (Vandell, Pierce & Dadisman, 2005) argued that the control groups had higher pre-existing achievement, thus reducing the potential for finding a program impact, and that the small impacts had more to do with lack of full program implementation during the initial years than with the strength of the program.

Overall, these studies documented positive causal effects on the academic performance of students in select after-school programs, but the evidence is mixed both because of research methods (few randomized trials) and poor program quality and implementation.

Theory of action and key operation mechanisms. Several developmental theories have been used to understand how effective after-school programs work, including ecological systems theory, stage-environment fit theory, flow theory, and attachment theory in addition to the roles and function of relationships with peers (Vandell, Pierce & Dadisman, 2005). Using these theoretical frames applied to various programs that have been studied and focusing on the developmental and learning needs of children and adolescents, Vandell and her associates identified positive relationships between program staff and students, rich content-based program activities, and learning- and mastery-oriented content delivery strategies as the major features of effective after-school and extended-day programs (See Chart 3 below). A widely referenced review of extended-day and after-school programs identifies academic, recreational, and cultural

components of an effective after-school program with an emphasis on training staff for effective implementation (Fashola, 1998).

These researchers identified several structural and institutional supports necessary for effective after-school programs including:

- Staff qualifications and support (staff training in child or adolescent development, after-school programming, elementary or secondary education, and content areas offered in the program, staff expertise; staff stability/turnover; compensation; institutional supports)Program/group size and configuration (enrollment size, ages served, group size, age groupings and child staff ratio)
- Financial resources and budget (dedicated space and facilities that support skill development and mastery, equipment and materials to promote skill development and mastery; curricular resources in relevant content areas; location that is accessible to youth and families)
- Program partnerships and connections (with schools to connect administrators, teachers and programs; with larger networks of programs, with parents and community);
- Program sustainability strategies (institutional partners, networks, linkages; community linkages that support enhanced services; long term alliances to ensure long term funding).

Chart 3

Process and Content Features Characterizing Effective Extended Day Programs

PROCESS ISSUES	
Positive staff-child relationships	• Staff treat children/youth with warmth, acceptance and respect • Staff provide emotional support to children/youth • Staff communicate high expectations/positive norms for child/youth behavior and mastery • Staff set age-appropriate limits for children/youth • Staff affirm cultural identity
Positive peer relationships	• Staff promote tolerance, understanding, and appreciation of differences • Staff promote positive social interactions and communication among youth • Staff encourage inclusion and use strategies for building group identity and focusing group(s) of children/youth on common goals • Staff help youth to develop conflict resolution skills and strategies for addressing threatening/bullying behavior • Staff promote understanding of cultural identity and diversity
Connections with families and the community	• Staff communicate with family about youth experiences • Families are welcome to volunteer and visit the program • Activities for youth connect them with neighborhood resources and to community mentors and leaders
PROGRAM CONTENT AND ACTIVITIES	
Content-based learning opportunities that include a mix of academic and nonacademic skill-building activities	• Arts, aesthetics, culture • Homework and tutorial assistance • Community service • Interdisciplinary and applied content • Opportunities to use written and expressive language to convey ideas, perspectives, and interests in varied contexts • Opportunities to read and exchange ideas about books for varied purposes • Activities and games for practicing and applying everyday and school mathematics • Opportunities to develop planning, decision-making, information-seeking, and critical thinking
Physical/recreation activities	• Formal or informal sports/fitness activities • Recreational activities
DELIVERY STRATEGIES	
Structured and unstructured learning opportunities	• Coaching/tutoring/Co-learning/collaboration/cooperation • Active/hands-on and interactive activities and project-based learning • Discourse, debate, and discussion with peers and adults • Multimodal communication (language, writing, art, music, performance)
Mastery orientation	• Sustained activities and opportunities for practice and skill development • Goal setting, reflection, self-evaluation • Culminating activities
Opportunities for autonomy, choice, and leadership	• Opportunities for making choices, solving problems, setting priorities • Formal and informal leadership opportunities

Recommendation. We recommend that an extended-day program be added to the Wyoming Block Grant. The resources would be used to provide students in all elementary grades and in secondary schools with additional help – during the school year but after the normal school day – to meet academic performance standards.

Because not all at-risk students will need or will attend such a program, we recommend that resources be provided for 50 percent of the unduplicated "at-risk" pupil count (free and reduced price lunch, ELL and mobile), a need and participation figure suggested by a recent study (Kleiner, Nolin & Chapman, 2004). We suggest that a 1.0 FTE position for every 15 eligible students (defined as 50 percent of the unduplicated pupil count) and paid at the rate of 25 percent of the position's annual salary to offer a 2 ½ to 3 hour extended-day program 5 days per week. These resources could be used for a different mix of teachers and other non-certified staff, with teachers providing at least one hour of homework help or after school tutoring.

The state should monitor over time the degree to which the estimated 50 percent figure accurately estimates the numbers of students needing extended-day programs. We also recommend the state require districts to track the students participating in the programs, their pre- and post-program test scores, and the specific nature of the after school program provided, to develop a knowledge base about which after-school program structures have the most impact on student learning.

A2d. Summer School

Current Wyoming Block Grant. The current Wyoming Block Grant does not have a provision for summer school, but the state provides $4.5 million in 2005-06 outside of the Block Grant for summer school programs. Several local school districts provide summer school

programs, and funds from the current at-risk formula can be used to finance such programs, as can federal Title I dollars.

The Evidence. Like many other states, Wyoming has set high standards for student achievement. And, many in Wyoming and other states view summer school programs as having promise to give at-risk students the additional time and help to achieve to standards and earn academic promotion from grade to grade (Borman, 2001). Providing additional time to help all students master the same content is an initiative that is grounded in research (National Education Commission on Time and Learning, 1994).

Research dating back to 1906 shows that students, *on average*, lose a little more than a month's worth of skill or knowledge over the summer break (Cooper, Nye, Charlton, Lindsay, & Greathouse, 1996). Summer breaks have a larger deleterious impact on poor children's reading and mathematics achievement, which falls further over the summer break than does that of middle-class students. This loss can reach as much as one-third of the learning during a regular nine-month school year (Cooper et al., 1996). A longitudinal study, moreover, showed that these family income-based summer learning differences *accumulate* over the elementary school years, such that poor children's achievement scores – without a summer school – fall farther and farther behind the scores of middle class students as they progress through school grade by grade (Alexander & Entwisle, 1996). As a result of this research, there is emerging consensus that what happens during the summer can significantly impact the achievement of students from low-income and at-risk backgrounds, and thus reduce the poor and minority achievement gaps in the United States (see also Heyns,1978).

Evidence on the effectiveness of summer programs in attaining either of these goals, however, typically has been of poor quality. Although past research linking student achievement

to summer programs shows some promise, several studies suffer from methodological shortcomings and the low quality of the summer school programs themselves.

Two reviews of summer school programs (Ascher, 1988; Austin et al., 1972) concluded that summer school programs in elementary mathematics and reading generally produced modest achievement gains, but noted the findings were tentative because none of the evaluations employed random assignment. Austin et al. (1972) also stated that few summer programs established clear academic goals that were easily evaluated, and in many cases funding arrived too late for a full summer program, thus diminishing potential impact. On the other hand, a more recent meta-analysis of 93 summer school programs (Cooper, Charlton, Valentine, & Muhlenbruck, 2000) found that the average student in summer programs outperformed about 56 percent to 60 percent of similar students not receiving the programs. Again, however, the certainty of these conclusions is compromised because only a small number of studies (e.g., Borman, Rachuba, Hewes, Boulay, and Kaplan, 2001) used random assignment, and program quality varied substantially.

Nevertheless, research generally suggests that summer school is needed and can be effective for at-risk students. Studies suggest that the effects of summer school are largest for elementary students when the programs emphasize reading and mathematics, and for high school students when programs focus on courses students failed during the school year. The more modest effects frequently found in middle school programs can be partially explained by the emphasis in too many middle school summer school programs on adolescent development and self efficacy, rather than academics.

Although Cooper et al.'s (2000) meta-analysis found students who participated in summer school outperformed other students, program effects varied significantly because the

nature of the programs varied so widely. Wyoming should look to those programs with quality research supporting the academic improvement of summer school participants. For example, using a randomize sample of 325 students who participated in the Voyager summer school program, research found that these students showed gains in reading achievement , with an **effect size** of **0.42** (Roberts, 2000).

Theory of action. Though learning at a similar rate during the regular school year, low-income and many minority children experience academic learning losses over the summer, with the losses accumulating every summer leading to larger and larger achievement gaps. A summer school program that focused on improving mathematics and reading achievement, and courses failed in high school, would help curtail the growth of the achievement loss and help these students learn to state performance standards over time. Cooper et al. (1996) suggest a focus on reading only if the intent is just to close the achievement gap, but a focus on both reading and mathematics will help lower-income students make progress in learning to all state standards.

Key operating mechanisms. Ascher (1988), Austin et al., (1972) and Heyns (1978) identified several programmatic characteristics that undercut program impacts and thus produced the modest effects research has documented so far. They include short program duration (sometimes a result of funding delays and late program start dates), loose organization, little time for advanced planning, low *academic* expectations for either mathematics or reading, discontinuity between the summer curriculum and the regular-school-year curriculum, teacher fatigue, and poor student attendance. In their meta-analysis of summer-program effects, Cooper et al. (2000) noted several program components that are related to improved achievement effects for summer program attendees. These are supported by the recommendations in the most recent book on summer school and how to enhance its impacts (Borman & Boulay, 2004):

- Early intervention during elementary school
- A full 6-8 week summer program
- A clear focus on mathematics and reading achievement, or failed courses for high school students
- Small-group or individualized instruction
- Parent involvement and participation
- Careful scrutiny for treatment fidelity, including monitoring to ensure good instruction in reading and mathematics is being delivered
- Monitoring student attendance.

Summer programs that include these elements hold promise for improving the achievement of at-risk students and closing the achievement gap.

Recommendation. We recommend that the Wyoming Block Grant include a summer school provision for 50 percent of all at-risk students (free and reduced price lunch, ELL and unduplicated mobile) in all grades K-12, as an estimate of the number of students still struggling to meet academic requirements (Capizzano, Adelman & Stagner, 2002). We provide resources for a program of eight weeks in length, class sizes of 15 students, and a six hour day, which allows for four hours of instruction in reading and mathematics, though the specific academic focus could be different for high school students. A six hour day would also allow for two hours of non-academic activities. The cost of each FTE teacher position would be estimated using a stipend equal to 25 percent of his/her annual salary. The formula is 0.25 FTE for every 30 at-risk students for summer schools (as well as extended day programs). The 50 percent estimate of at-risk student need should be monitored over time to determine the degree to which it correctly estimates the number of at-risk students who need a summer school program.

We initially recommended that elementary extended-day and summer school programs be provided to students in just grades 4 and 5. But the Professional Judgment Panels all recommended that the program be available to students in all grades in elementary schools, and provided several examples both of such younger students attending such programs and benefiting from them. So *we modified our recommendation to include eligible students at all grade levels in elementary schools for extended day and summer school programs, and the Committee concurred with that revision during its June30-July 1, 2005 meeting*.

Thus, our overall recommendations for most at-risk students is a sequenced set of connected and structured programs that begin in the early elementary grades and continue through the upper elementary, middle and high school levels. We are proposing that the most academically deficient at-risk students receive one-to-one tutoring, that the next group receive intensive and explicit instruction in groups of three or five, that students still struggling to meet proficiency standards then receive an extended day program that includes an academic focus, and that kids needing even more help then be offered a summer school program that is structured and focused on academics – reading and mathematics for elementary and middle school students, and failed courses for high school students.

Since the exact combination of services that will bring the vast proportion of at-risk students achieving to a proficiency level is not precisely known at this time, we also recommend that Wyoming add accountability and reporting requirements to receipt of these funds. Schools should be required to identify the students that receive any and all of these interventions, data should be kept on their performance when they enter and when they exit the programs, and data on program structure and content should also be reported. In this way, the state over time will be better able to identify what features of each of these interventions is most effective in Wyoming,

how much learning gains is produced by the various programs, and also perhaps what sequence of interventions works best for which types of at-risk students. In this way, the state can be both providing resources to meet the needs of at-risk students and simultaneously learning how to provide these services more effectively over time. Without such a reporting requirement, money will be spent but knowledge about the programs, their design and their effects will be lost.

A2e. Alternative Schools

Current Wyoming Block Grant. Several school districts across the state have designated alternative schools that have been created for students who need an educational environment different from the traditional public school. These schools are funded as a regular high school through the resources that are included in the prototypical high school model. Because the alternative schools are generally quite small, they also receive the small school adjustments in the funding model as appropriate to their size.

The Evidence. A small number of students have difficulty learning in the traditional school environment. These students, many of whom have some combination of significant behavioral, social and emotional issues, often do much better in small "alternative learning environments." Many Wyoming school districts have various versions of "alternative schools" for such students, and these small high schools now are funded via the high school prototype and the small high school adjustment. Other high schools might have an "alternative school" program for students who do not fit well in the regular high school, but there is no count of the students in these programs, and the resources for these high school programs are provided through the normal high school funding model. Nevertheless, we have concluded it is time for Wyoming to formally create an Alternative School funding formula.

At the Professional Judgment Panel on Small Schools, there were several individuals who were operating or had operated an Alternative High Schools. Several of the alternative schools were in the 50-60 student range, and tended to have an administrator and several teachers. The average staffing ratio was about one administrative position and 1 FTE for every 7 students. Since alternative high schools have a special "at-risk" designation, we conclude that it is time to recognize them with a separate funding formula and to have the state encourage districts that operate such programs within the regular high school to begin designating these as separate programs, so the students in them can trigger Alternative School resources.

Recommendation. We recommend that Wyoming resource Alternative High Schools through the block grant by providing them with one administrative position (priced at the level of an assistant principal) plus 1 FTE position for every 7 alternative school students. This staffing ratio would cover all certified staff in the school – administrators, teachers, specialists, tutors, extended day, summer school, and pupil support. The Committee approved this recommendation at its August 23rd meeting.

The Committee also decided that it was time for Wyoming to have some formal rules and regulations for Alternative Schools, as such schools now will have a separate and specific funding formula. Thus the Committee also voted to ask the Wyoming Department of Education and State Board of Education to develop rules and regulations for Alternative School designation.

A3. Substitute teachers

Current Wyoming Block Grant. The current block grant funding model calculates the number of funded substitute teachers to be equal to five percent of the number of ADM-generated teachers for all grade levels (line 1). The 2001-02 payable rate for the elementary and

middle school levels was approximately $67.97 per day for 175 days and approximately $79.30 per day for 175 days at the high school level. Health care benefits are not provided for in the current block grant funding model.

The Evidence. Schools need some level of substitute teacher allocations in order to cover classrooms when teachers are sick for one or two days, absent for other reasons, on long term sick or pregnancy leave, etc. In many other states, substitute funds are provided at a rate of about ten days for each regular classroom and specialist teacher, very close to the current Wyoming system.

Recommendation. We recommend that Wyoming retain its current substitute teacher allocation of five percent for all teachers. The teacher count would equal the number of all teachers listed in Chart 1 above – core teachers, specialist teachers, instructional facilitators, and teachers in all the at-risk programmatic interventions – tutors, LES, extended day, and summer school (Lines 1a, 1b and 1c, and lines 2a, 2b, 2c, and 2d). The number of substitute teacher positions would then be multiplied by 175, the average number of student contact days in the year, to determine the number of substitute days that would be provided. At the suggestion of the Professional Judgment Panels, we also recommend that the substitute pay rate be increased a uniform $85 per day for all substitutes, plus social security and Medicare, or 7.65 percent. This recommendation was approved by the Select Committee at its June 30-July 1 meeting.

A4. Aides

Current Wyoming Block Grant. The current Wyoming cost-based funding model provides financial resources for 2.0 FTE aides in the elementary and middle school prototypes and 5.0 FTE aides in the high school prototype. The aide resources are for both instructional and non-instructional purposes.

The evidence. Elementary, middle and high schools need staff for such duties as lunch duty, before and after school playground supervision, helping elementary students get off the bus in the morning and on the bus at the end of the school day, etc. We generally have provided funds for such aides at about the rate of 2 FTE aide positions for a school of 500.

But the research is not supportive of instructional aides. As noted above, the Tennessee STAR study, which produced solid evidence through field-based randomized trails that small classes work in elementary schools, also produced evidence that instructional aides in schools do not add value, *i.e*., do not positively impact student academic achievement (Achilles, 1999; Gerber, Finn, Achilles & Boyd-Zaharias, 2001).

At the same time, districts may want to consider a possible use of instructional aides that is supported by research. There are two studies that show how instructional aides could be used to tutor students. Farkas (1998) has shown that if aides are selected according to clear and rigorous literacy criteria, are trained in a specific reading tutoring program, provide individual tutoring to students in reading, and are supervised, then they can have a significant impact on student reading attainment. Some districts have used Farkas-type tutors for students still struggling in reading in the upper elementary grades. Another recent study by Miller (2003) showed that such aides could also have an impact on reading achievement if used to provide individual tutoring to struggling students in the first grade.

We should note that neither of these studies supports the typical use of instructional aides as teacher helpers. Evidence shows that instructional aides can have an impact but only if they are selected according to educational criteria, trained in a specific tutoring program, deployed to provide tutoring to struggling students, and closely supervised.

Recommendation. At this point, we recommend that Wyoming retain the aide recommendations in the Block Grant, but mainly for their non-instructional uses. This recommendation was approved by the Select Committee at its June 30-July 1 meeting.

We do not recommend funds be provided for instructional aides. A school or district could decide to use resources, including some of those recommended for at-risk students, provided in the Block Grant for Farkas-type reading tutors, but to be effective they would need to follow his suggestions for training, focus and supervision.

A5. Pupil Support/Family Outreach

Current Wyoming Block Grant. The current system provides for 1.0 FTE, 2.0 FTE and 4.0 FTE for student support for each of the prototypical elementary, middle and high schools, respectively.

The Evidence. Schools need **a student support and family outreach strategy**. Various comprehensive school designs have suggested different ways to provide such a program strategy (Stringfield, Ross & Smith, 1996; for further discussion, see Brabeck, Walsh & Latta, 2003). In terms of level of resources, the more disadvantaged the student body, the more comprehensive the strategy needs to be. The general standard is one licensed professional for every 100 students from a low-income or "at-risk" background, with a minimum of one for each school.

Although there are many ways schools can provide outreach to parents, or involve parents in school activities – from fund raisers to governance – research shows that school sponsored activities that impact achievement address what parents can do at home to help their children learn. For example, if the education system has clear content and performance standards, which Wyoming's does, helping parents and students to understand both what needs to be learned and what constitutes acceptable standards for academic performance would be

helpful. Put succinctly, parent outreach that explicitly and directly addresses what parents can do to help their children learn, and to understand the standards of performance that the school expects, are the types of school-sponsored parent activities that produce discernible impacts on student's academic learning (Steinberg, 1996, 1997).

At the elementary school level, the focus for parent outreach and involvement programs should concentrate on what parents can do at home to help their children with academic work for school. Too often parent programs focus on fund raising through the parent-teacher organization, involvement in decision making through school site councils, or other non-academically focused activities at the school site. Although these school-sponsored parent activities might impact other goals – such as making parents feel more comfortable being at school or involving parents more in some school policies – they have little effect on student academic achievement. Parental actions that impact learning include: 1) reading to their children at young ages, 2) discussing stories and their meanings, 3) engaging in open ended conversations, 4) setting aside a place where homework can be done, and 5) ensuring that their child completes homework assignments.

At the secondary level, the goal of such activities should include having parents learn about what they should expect of their children in terms of their learning and academic performance in secondary school. If a district or a state required a minimum number of courses for graduation, that requirement should be made clear. Further, if there were similar or more extensive course requirements for admission into state colleges and universities, those requirements should be addressed. Finally, if either average scores on end-of-course examinations or a cut-score on a comprehensive high school test were required for graduation, they too should be discussed. The point is that secondary schools need to help many parents

know how to more aggressively assist their children in determining an academic pathway through middle and high school, expectations for acceptable standards for performance, and at the high school level, an understanding of the course work necessary for high school completion and college entrance.

In addition, middle and high schools need some level of guidance counselor resources. We generally recommend 1.0 FTE guidance counselor for the middle school and 2.0 FTE for the high school, each of 500 students, based on professional standards for staffing. Indeed, at the high school level, the American School Counselor Association (ASCA) recommends 1.0 FTE counselor for every 250 students.

Recommendation: Our recommendation is to provide 1.0 FTE position for every 100 "at-risk" students (free and reduced price lunch, ELL and mobile), with a minimum of one for each of the prototypical school models (288 student elementary, 315 student middle and 315 student high school). In addition, we initially recommended providing an additional 1.26 guidance counselor position and an additional 2.52 guidance counselor positions in the prototypical middle and high school models, respectively, based on the ASCA standards. This recommendation was approved by the Select Committee at its June 30-July 1 meeting.

This recommendation would enable districts and schools to allocate FTE across guidance counselors, nurses, as well as social workers, in a way that best addresses such needs from the perspective of each district and school.

But at the August 23rd meeting during the discussion of developing a secondary resource model that would pertain equally to middle and high schools, the Committee voted to change the guidance counselor position from 1.2 in the middle school to the same ratio as that for the high school, i.e., 1 guidance counselor for every 250 students.

Therefore the recommendation for pupil services is 1.0 FTE position for every 100 at-risk students in elementary schools, with a minimum of 1 for the 288 student prototype, and at the middle and high schools 1.0 FTE position for every 100 at-risk students, with a minimum of one position for the 315 prototype, plus 1.0 FTE guidance counselor position for every 250 students for secondary – middle and high – schools.

A6. Librarians

Current Wyoming Block Grant. The current Wyoming Cost-Based Block Grant provides resources for 1.0 FTE librarian/media technician for the elementary school prototype, 1.0 FTE librarian and 1.5 FTE media/technology assistants for the middle school prototype, and 1.0 FTE librarian and 2.0 FTE media/technology assistants for the high school prototype.

The Evidence. Most schools have a library, and the staff resources must be sufficient to operate the library and to incorporate appropriate technologies into the library system. Further, some elementary librarians could teach students for some of the day as part of special subject offerings.

Recommendation. We recommend that Wyoming retain its current librarian staffing of 1.0 FTE librarian/media technician for the elementary school prototype, 1.0 FTE librarian and 1.5 FTE media/technology assistants for the middle school prototype, and 1.0 FTE librarian and 2.0 FTE media/technology assistants for the high school prototype.

The Professional Judgment Panels proposed that all secondary schools should have at least a full time librarian, and recommended that we phase out the media/technology staff for smaller schools. We agree with that proposal and recommend the following for librarian and library technician resources in the prototype schools:

Recommended Library and Library Technician Resources for the Wyoming School Funding Model

	Elementary			Middle			High School			
	96	192	288	105	210	315	105	210	315	630
Librarian	0.33	0.67	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Library Technician				0.33	0.67	1.0	0.33	0.67	1.0	2.0

A7. School Site Administration

Current Wyoming Block Grant. The current block grant provides for 1.0 administrative position in each prototypical elementary and middle school, and 2.0 administrative positions (a principal and assistant principal) in the prototypical high school.

The Evidence. There really is no research evidence on the performance of schools with or without a principal. The fact is that essentially all schools in America, if not the world, have a principal. All comprehensive school designs, and all prototypic school designs from all professional judgment studies around the country (see for example, Appendix A), include a principal for every school unit. However, few if any comprehensive school designs include assistant principal positions. And very few school systems around the country provide assistant principals to schools with 500 students or less. Since we also recommend that instead of one school with a large number of students, school buildings with large numbers of students should be sub-divided into multiple school units within the building, we recommend that each unit have a principal. This implies that one principal would be required for each school unit.

Recommendation. We recommended one principal position for each prototypical school. In discussions at the May 2005 meeting, the Select Committee recommended that we include an additional administrative position for the high school, which could cover some combination of the responsibilities of the assistant principal, athletic director, and activities director. This

recommendation largely reflects current practice. High school buildings with, for example 1,260 students, would be provided with 1.0 FTE principal and 3.0 FTE assistant principal/athletic-activities director positions, and could organize themselves into two school-units, each with a principal and AP/AD, with one "super-ordinate" principal in charge. And larger high schools could staff themselves as several prototypical schools as they would receive one principal and one AP/AD for the first 630 students, and an AP for each additional 630 students. We should note that we have also recommended instructional facilitators for all prototype schools, so the prototypical high school would receive 1.0 principal and 1.0 AP/AD positions and 3.0 instructional facilitators.

A8. School Clerical Staff

Current Wyoming Block Grant. The current funding model provides for 2.0 FTE clerical/data entry personnel in the elementary and middle school prototypes and 5.0 FTE in the high school prototype.

Recommendation. We recommend retaining the current Wyoming resourcing strategy for clerical and support staff. We also recommend, at the suggestion of the Professional Judgment Panels, that these staffing recommendations include 1.0 senior secretarial position in each school prototype and that the other positions be at the clerical/data entry level, and that the latter be phased down and out for small schools, thus leaving the senior secretarial position. The Select Committee agreed with this approach at its June 30-July 1, 2005 meeting.

Effect Sizes of Major Recommendations

Throughout the report, we have identified "effect sizes" of the programmatic proposals. Effect size is the amount of a standard deviation in higher performance that the program produces for students who participate in the program versus students who did not. An effect size

of 1.0 would indicate that the average student's performance would move from the 50th to the 83rd percentile. The research field generally recognizes effect sizes greater than 0.25 as significant and greater than 0.50 as substantial. The effect sizes of the major recommendations are presented in Chart 4.

Chart 4

Estimated Effect Sizes of Major Recommendations

Recommended Program	Effect Size
Full Day Kindergarten	0.77
Class Size of 15/16 in Grades K-3	
Overall	0.25
Low income and Minority Students	0.50
Multi-age classrooms	
Multi-grade Classrooms	-0.1 to 0.0
Multi-age Classrooms	0.0 to 0.50
Professional Development with Classroom Instructional Coaches	1.25 to 2.70
Tutoring, 1-1	0.4 to 2.5
English-Language Learners	0.45
Extended-Day Programs	
Structured Academic Focused Summer school	0.45
Embedded Technology	0.30 to 0.38
Gifted and Talented	
Accelerated Instruction or Grade Skipping	0.5 to 1.0
Enrichment Programs	0.4 to 0.7

B. Supplies Instructional Materials

Current Wyoming Block Grant. The October 2003 recalibration report (Hayward, Smith, Seder & Ehlers, 2003) shows that the current Wyoming cost-based block grant funding model provides resources for instructional supplies and materials in the amount of $258.00 per elementary school ADM, $243.03 per middle school ADM, and $306.72 per high school ADM.

The Evidence. These allocations are very close to the estimate we have used in other states of $250 per pupil for instructional materials and supplies, including textbooks.

The major issue that arose in the Professional Judgment Panels for this issue was the reason behind the nominally higher instructional materials figure for elementary schools compared to middle schools. When the consultants responded that technically the figures were different, but practically they were the same (being $258 per pupil for the elementary and $243 for the middle level), one panel suggested averaging the two and moving forward with the same number for elementary and middle schools. We concur with this recommendation.

Though many wondered whether the totals were adequate, when reminded that the numbers in the document represent the figures from the 2002 recalibration document and need to be inflated up to the 2005-06 school year, most concluded that the figures were fine. Further, the proposed numbers are larger than the $188/pupil that actually was spent on these items during the 2003-04 school year.

Recommendation: Thus, *we recommend that the following 2002 figures be used for instructional materials* and supplies *inflated up* to an appropriate level with the external cost adjustment for the 2005-06 school year, the year in which the recalibrated formula will be initially simulated.

	Elementary	Middle School	High School
Instructional Materials and Supplies	$250.50	$250.50	$306.72
Inflated figures	$285.57	$285.57	349.66

The Select Committee approved this recommendation at its June 30-July 1 meeting.

C. Equipment and Technology

Current Wyoming Block Grant: Funding for technology is embedded in the school-level prototypes in the "Equipment" line item. Based on the 2001-02 recalibration, the dollar allocations for "Equipment" were $163.64 per elementary school student, $170.15 per middle school student, and $198.12 per high school student.

The Evidence. Over time, schools need to **embed technology in instructional programs and school management strategies**. Although the use of technology in schools may seem vital to most, the effect it produces depends on how it is used, and the training that is provided for that use. In general research has identified four areas in which education technology can benefit students: 1) student preparation to enter the workforce or higher education, 2) student motivation, 3) student learning or increased academic achievement, and 3) teacher/student access to resources (Earle, 2002).

Student preparation for *higher education or the workforce* concerning technology includes technology literacy and the ability of students to find, sift, manipulate and communicate information using the latest versions of the software. Government organizations, both inside and outside education, view technology use in schools as workforce preparation. In 1991, the Secretary's (of Labor) Commission on Achieving Necessary Skills (SCANS) issued a report that underscored the need for students to be able to select technical equipment and tools, apply technology to specific tasks, and maintain and troubleshoot computers. The 21st Century

Workforce Commission (U.S. Department of Labor, 2000) called for students to have technological proficiency to compete in a "highly-skilled" workforce. Dede (2000a, 200b) echoed this view in an article written for the Council of Chief State School Officers emphasizing the importance of informational and technical literacy. Gilster (2000) argued that technology skills go beyond informational and technical literacy, encompassing what he calls *digital literacy*. Most recently, the *National Education Technology Plan* released by the U.S. Department of Education (2004:6) emphasized the need "to help secure our economic future by ensuring that our young people are adequately prepared to meet these challenges [competition in the global economy]."

Aspects of *increased student motivation* include gains in student attitude toward schoolwork, time on task, quality of work, and/or improved attendance. Becker (2000) found that teachers who structure the right type of assignments using technology motivate students to spend more time on them. Teaching methods that encourage students to create their own learning path, a "natural" for good technology (think of the popularity of many complex computer games), produce more excitement than drill-and-practice types of activities (Becker, 2000; Lewis, 2002; Valdez et al, 2000).

The third impact of technology is increased student achievement. Although there are mixed results on the impact of technology on student achievement, (Earle, 2002; Archer, 2000; Kulik, 2003; Kulik, 1994), many studies are based on small cases, evidence in several studies is anecdotal, too many programs are of short duration and not tested through replication, and many studies lack appropriate control groups. Thus, it is difficult to get a clear picture of the impact of technology on student achievement from the studies that exist.

Nevertheless, the reviews document effect sizes from embedded technology in instructional programs and school management strategies that range from 0.30 (Waxman, Connell & Gray, 2002) to 0.38 of a standard deviation improvement in test scores (Murphy, Penuel, Means, Korbak, Whaley & Allen, 2002), thus approximating the effects of class size reduction in the early grades.

Nevertheless, there are several recent reviews of studies that can help. The Milken Family Foundation (1999) reviewed five large-scale studies of the impact of education technology on student achievement: 1) the 1994 Kulik study, 2) Sivin-Kachala's (1998) research review, 3) Apple Classrooms of Tomorrow (ACOT) (Baker, Gearhart, & Herman, 1994), 4) West Virginia's Basic Skills/Computer Education (BS/CE) Statewide Initiative (Mann, Shakeshaft, Becker, & Kottkamp, 1999), and 5) Wenglinsky's (1998) National Study of Technology's Impact on Mathematics Achievement. Positive effects were found in all of these studies but all studies had caveats. For example, in the Wenglinsky study, eighth grade students using computer simulations had measurable gains in mathematics scores but only if the computers were used correctly and teachers had been trained in, and implemented correctly, proper teaching techniques. The ACOT study showed measurable gains in student *attitude* but no measurable increases in learning. And, in the West Virginia study, scores on the Stanford 9 for 5th graders increased, but it is not clear if technology was the sole cause for the gains.

In qualifying their generally positive conclusions, the Milken (1999: 10) study wrote that although gains were shown in all studies, "learning technology is less effective or ineffective when learning objectives are unclear and the focus of technology is diffuse." In other words, if a teacher does not know exactly what to do with a computer, how to use the right teaching method

designed to fit a specific goal, and what software is effective for that goal, then limited or no learning gains will result.

Other research has reached more optimistic findings about the impact of technology on student achievement, specifically a positive impact on student test scores of curriculum programs that embed technology into the instructional delivery system. The reviews documented effect sizes from 0.30 (Waxman, Connell & Gray, 2002) to 0.38 of a standard deviation improvement in test scores (Murphy, Penuel, Means, Korbak, Whaley & Allen, 2002), thus approximating the effects of class size reduction in the early grades.

In one of the most recent meta-analyses of the impact of specific technology programs, Kulik (2003) found that "integrated learning systems," i.e., programs tailored to individual students with ongoing diagnoses and feedback, had average effects of 0.38 in mathematics but much lower (0.06) in reading, although the effects were higher for the Jostens program (now called Compass Learning) – 0.37 in reading and 0.22 in mathematics. For all programs, the effect is larger the greater the amount of time the student spends on them and when students work in structured pairs. Word processing also has significant and positive effects on students' writing proficiency (Bangert-Drowns, 1993; Cochrane-Smith, 1991). Though more work is needed on designing strategies for integrating computer technologies into instruction, the emerging research suggests that doing so can have significant positive impacts on student learning when used effectively.

Finally, education technology has opened schools and their students to a world of resources that can be explored and manipulated. The Internet affords access to information, communication, opinions, simulations, current events, and academic coursework that were

formerly inaccessible or delayed. Networks allow districts to communicate and share data with their schools all with the purpose of increasing student achievement.

Looking at technology outside of direct student use, computers and software also have increased importance as an administrative tool. As the demands of NCLB legislation intensify, schools have begun to rely on data as a means to achieving instructional excellence through gap analysis of student benchmark tests. Student administration systems and other programs that collect, analyze, and assist administrators and teachers to interpret student data more efficiently have become common. Edusoft, Renaissance Learning, Scantron, and other vendors provide such analytical tools. As these programs become more complex their initial and ongoing direct and indirect costs will continue to increase.

In sum, although the evidence is somewhat mixed, we conclude that technology, if used correctly, is important for preparing the student for both postsecondary education and the workforce, can increase student motivation to learn, positively impacts student achievement, and opens a new world of resources for schools and their students.

In terms of identifying the ***costs*** *of purchasing and embedding technology* into the operation of schools, significant advances have emerged over the past decade (COSN 2001, 2004). One term that has emerged is the *Total Cost of Ownership* (TCO). *Total Cost of Ownership* is a type of calculation designed to help policy makers and administrators assess both the direct and indirect costs of technology. The *direct costs* of technology include hardware, software, and direct labor costs. *Direct labor* refers to those individuals who are specifically hired by the district to repair, update, and maintain instructional technology. *Indirect costs* include the costs of users supporting each other, time spent in training classes, casual learning, self support, user application development and downtime costs (COSN, 2004).

TCO can vary greatly depending on district context, including the age of equipment, and the level to which the district makes education technology an integral part of the instructional and management strategies. Eight case studies conducted by COSN and the Gartner Group (2003, 2004) in various states and in urban, suburban and rural school districts found that total **direct annual costs** varied from a low of $385 per pupil in a rural district to a high of $1,242 per pupil in a suburban district, with a median at about $750. But these numbers included both direct and indirect costs.

While a total per pupil figure in the TCO model is useful, we will identify direct labor costs separately from direct technology costs, and have incorporated the training costs into our professional development recommendations, so we mainly need to identify the direct costs of purchasing, upgrading, and maintaining computer technology hardware and software. In studies that have been conducted by several states and conducted as part of several professional judgment studies (Appendix A) of this narrower aspect of technology costs, the annual costs per student are about $250 for the purchase, update, and maintenance of hardware and software (Odden, 1997; Odden, Fermanich & Picus, 2003). This figure also is almost exactly what the average direct costs would be for the 8 TCO case studies (COSN, 2004) reported above and adjusted to provide a one-to-three student-to-computer ratio.

The $250 per pupil figure would be sufficient to purchase, upgrade and maintain computers, servers, operating systems and productivity software, network equipment, and student administrative system and financial systems software, as well as other equipment such as copiers. Since the systems software packages vary dramatically in price, the figure would cover medium priced student administrative and financial systems software packages.

We should note that these resources would be used effectively only if the professional development, funded below, provides training to teachers and administrators in how to embed technology into the instructional and management programs of each school. Moreover, as noted earlier in this report, a partial role for at least one of the instructional facilitators is to have the skills to install software programs on a school's network and its computers, to be the onsite expert who can fix modest network and computer problems, and who can help teachers and administrators use the technology equipment effectively. Finally, current resources for central office staffing include a technology coordinator and any changes would not eliminate that position.

Recommendation: We recommend that each prototype school receive $250 per pupil to keep local technology working and updated and for schools to purchase (or lease) computers, servers and software, including security, instructional and management software, to have an overall ratio of one computer to every two to three students. For clarity, a one-to-three ratio would be sufficient to provide every teacher, the principal, and other key school-level staff with a computer, and to have an actual ratio of about one computer for every three-to-four students in each classroom. This level of funding would also allow for the technology needed for schools to access distance learning programs, and for students to access the new and evolving state testing system, PAWS. Fortunately, Wyoming has developed a substantial technology infrastructure over the years, so most if not all schools are linked to the Internet and to district offices and/or a state network. Our technology consultant also concluded that this allocation would be sufficient for small schools as well, particularly today when schools begin with some technology.

Several individuals at the June Professional Judgment Panels commented that more technical, repair support was needed for school-based computers, and identified numerous

individuals at both the central offices and the schools who were engaged in that task. At the same time, many of these same individuals said their computers were outdated and the high cost of fixing them was largely due to outmoded technology. Most of these individuals also concluded that the $250/pupil figure would enable them to have newer equipment which would allow them to reduce their maintenance expenses.

Further, we also would recommend districts either incorporate maintenance costs in lease agreements or, if purchasing the equipment, buy 24-hour maintenance plans. For example, for a very modest amount, one can purchase a maintenance agreement from a number of computer manufacturers that guarantees computer repair on a next business day basis. Panelists were concerned that it would be difficult for manufacturer's contractors to serve remote communities, but the maintenance agreement makes that the manufacturer's or contractor's problem and not the districts'. Indeed, these private sector companies often take a new computer with them, leave it, and take the broken computer to fix, which often turns out to be more cost effective than to send technicians all around to fix broken computers.

D. Food Services

The current Wyoming state policy for food services is that districts and schools will operate food service programs on a self-supporting basis, so no state support is needed. The assumption is that the costs of food services will be covered by meal charges and funds from the federal free and reduced price lunch program.

At the June Professional Judgment Panels, all but one district (Sheridan #2) said that their food service programs ran at a deficit. Deficits ranged from roughly $40/pupil to $135/pupil. However, the higher deficit districts also charged the lowest amount for meals, so one reason for higher deficits is a lower charge for each meal.

When we asked if there were private contractors to whom the districts could out-source food services, the near unanimous response was "no" – either there were no such companies in the rural areas or districts had had unacceptable experiences with the companies that existed in the larger communities.

Nearly all districts also stated that food service costs were likely to rise because of enhanced nutrition standards promulgated by the USDA. They were skeptical about whether they would be able to raise meal charges in line with these required higher costs.

It was not possible to fully understand why all districts were running food services deficits. This is perhaps an issue that deserves more analysis, before the state could identify whether deficits were unavoidable and required state financial assistance, as well as the level of financial assistance that treated all districts in a fair and equitable manner. For example, if the state were to adopt a per pupil subsidy for food services, it would need to determine the subsidy by offsetting costs with meal prices that were comparable across districts.

Recommendation: We recommend that no action be taken on food services until a more detailed analysis is conducted of the reasons for deficits in current food services operations.

The Select Committee approved this recommendation at its June 30-July 1 meeting.

E 1. Special Education

Current Wyoming Block Grant. All special education costs are reimbursed 100 percent by the state, and are outside the Block Grant.

The Evidence. Providing appropriate special education services, while containing costs and avoiding over-identification of students, particularly minority students, presents several challenges.

First, many mild and moderate disabilities, particularly those associated with students learning to read, are correctable through strategic early intervention. For example, several studies (e.g., Landry, 1999) have documented that through a series of intensive instructional interventions nearly 75 percent of struggling readers identified in Kindergarten and Grade 1 can be brought up to grade level without the need for placement in special education. In many instances this approach requires that school- level staff change their practice and cease to function in "silos" serving children in "pull-out" programs identified by the funding source of the staff member (e.g. General Fund, Special Education, Title I). Instead, all staff would team closely with the regular classroom teacher to identify deficits and work together to correct them as quickly as possible. This sounds like a common sense approach that would be second nature to school people, but in many cases they have heretofore been rooted in a "categorical culture" that must be corrected through staff development and strong leadership from the district office and the site principal. Allocating a fixed census amount (about 2.0 FTE for a Wyoming school of about 300 students) would work for mild and moderate disabilities only if a functional, collaborative early intervention model as outlined above could be implemented.

Second, for more severely handicapped students, clustering them to achieve economies of scale is generally the most effective strategy and provides the greatest opportunity to find ways to mainstream them (to the extent feasible) with regular education students. In very sparsely populated areas this is often not feasible but should at least be worth exploring. Students in these categories generally include: severely emotionally disturbed (ED); severely mentally and/or physically handicapped; and children with the spectrum of autism. The ED and autism populations have been increasing dramatically across the country, and it is likely that this trend will continue in the future. If the Wyoming model is to be for the state to continue to pay full costs as determined by the districts for services to these children it would make sense to explore clustering of services where possible and design cost parameters for clustered services in each category. In cases where due to geographic isolation students need to be served individually or in groups of two or three it would be helpful to cost out service models for those configurations as well.

Particularly in the case of ED and autism it is well worth building in the capacity to examine at the state level the service models, their effectiveness, and ways to make them more efficient and effective over time. Research on effective service models is growing in both areas and helpful hints for districts on improving services could potentially improve both quality and efficiency. For example, recent research on autism is strongly indicating that very early intervention after the onset of the condition (usually between 18 months and 3 years) yields far better outcomes when the child enters school. Federal funding supports special education infant/preschool programs and the strategic application of these services, coupled with ongoing analysis of school programs, could avert costs down the road. If there is no state capacity to do this it may be cost effective for the state to contract for these research/advisory services.

One new way states have begun to fund special education services is the "census" approach. The census approach, which can be simply embodied in a higher expenditure for an adequate Block Grant school finance formula, assumes the incidence of these categories of disabilities is approximately equal across districts and schools and includes resources for providing needed services at an equal rate for all schools and districts. The census approach has emerged across the country for several reasons:

- The continued rise in the number and percentage of "learning disabled" and continued questioning by some of the validity of these numbers
- Under funding of the costs of severely disabled students
- Over labeling of poor, minority, and LES students into special education categories, which often leads to lower curriculum expectations, and inappropriate instructional services
- Reduction of paper work.

Moreover, all current and future increases in federal funding for disabled students are to be distributed on a "census" basis. As a result, diverse states such as Arkansas, Arizona, California, and Vermont have moved to provide resources for students with mild disabilities through this strategy.

But the Census approach could produce difficulties in places like Wyoming which have a number of very small and rural isolated districts and schools, and might not be feasible in such locales. And, this funding approach was not sanctioned at the Professional Judgment Panels.

Recommendation: Both the Select Committee and virtually everyone at the professional judgment panels urged the state, for many reasons, to continue the current policy of 100 percent

state reimbursement for costs to provide services to disabled students, and we concur with that recommendation.

E2. Gifted Students[15]

Current Wyoming Block Grant. The current Block Grant includes about $10 per ADM to provide services for gifted students.

The Evidence. A sound analysis of educational adequacy should **include the gifted and talented students**, most of whom perform above state proficiency standards. Indeed, this is important for Wyoming as its citizens desire improved performance for students at all levels of achievement not just that all students achieve at or above a proficiency standard. Research shows that developing the potential of gifted and talented students requires:

- Effort to discover the hidden talent of low income and/or culturally diverse students
- Curriculum materials designed specifically to meet the needs of talented learners
- Acceleration of the curriculum
- Special training in how teachers can work effectively with talented learners.

Discovering Hidden Talents in Low-Income and/or Culturally Diverse High Ability Learners. Research studies on the use of performance assessments (Baum, Owen & Orrick, 1996; VanTassel-Baska, Johnson & Avery, 2002), and other strategies for identifying talented learners, such as nonverbal measures (Naglieri & Ronning, 2000; Naglieri & Ford, 2003), open-ended tasks (Scott, Deuel, Jean-Francois & Urbano, 1996), extended try-out and transitional periods (Borland & Wright, 1994; Maker, 1996), and inclusive definitions and policies (Gallagher & Coleman, 1992) document increased and more equitable identification practices for high-ability, culturally diverse, and/or low-income learners. However, identification is not

[15] This section is based on an unpublished literature review written by Dr. Ann Robinson, Professor, University of Arkansas at Little Rock.

sufficient; it must be accompanied by services (Rito & Moller, 1989). Access to specialized services for talented learners in the elementary years is especially important for increased achievement among vulnerable students. For example, high-ability, culturally diverse learners who participated in three or more years of specialized elementary and/or middle school programming had higher achievement at high school graduation than a comparable group of high ability students who did not participate (Struck, 2003). Gains on other measures of school achievement were reported as well

Access to Curriculum. Overall, research shows that curriculum programs specifically designed for talented learners produce greater learning than regular academic programs. Increasing the complexity of the curricular material is a key factor (Robinson & Clinkenbear, 1998). Large-scale curriculum projects in science and mathematics in the 1960s, such as the Biological Sciences Curriculum Study (BCSC), the Physical Science Study Committee (PSSC), and the Chemical Bond Approach (CBA), benefited academically talented learners (Gallagher, J., 2002). Further, curriculum projects in the 1990s designed to increase the achievement of talented learners in core content areas such as language arts, science, and social studies produced academic gains in persuasive writing and literary analysis (VanTassel-Baska, Johnson, Hughes & Boyce, 1996; VanTassell-Baska, Zuo, Avery & Little, 2002), scientific understanding of variables (VanTassel-Baska, Bass, Ries, Poland & Avery, 1998), and problem generation and social studies content acquisition (Gallagher & Stepien, 1996; Gallagher, Stepien & Rosenthal, 1992).

Access to Acceleration. Because academically talented learners learn quickly, one effective option for serving them is acceleration of the curriculum. Many educators and members of the general public believe acceleration always means skipping a grade. However,

there are at least 17 different types of acceleration ranging from curriculum compacting (which reduces the amount of time students spend on material they already know) to subject matter acceleration (going to a higher grade level for one class) to high school course options like Advanced Placement or concurrent credit (Southern, Jones & Stanley, 1993). In some cases, acceleration means content acceleration, which brings more complex material to the student at his or her current grade level. In other cases, acceleration means student acceleration, which brings the student to the material by shifting placement. Reviews of the research on different forms of acceleration have been conducted across several decades and consistently report the positive effects of acceleration on student achievement (Kulik & Kulik, 1984; Southern, Jones & Stanley, 1993), including Advanced Placement classes (Bleske-Rechek, Lubinski & Benbow, in press). Other studies report participant satisfaction with acceleration (Swiatek, 2002) and benign effects on social and psychological development (Rogers, 2002).

Access to Trained Teachers. Research and teacher reports indicate that general classroom teachers make very few, if any, modifications for academically talented learners (Archambault et al, 1993; Westberg, Archambault, Dobyns & Salvin, 1993), even though talented students have mastered 40 to 50 percent of the elementary curriculum before the school year begins (Reis et al, 1993). In contrast, students and independent classroom observers have documented that teachers who receive appropriate training are more likely to provide classroom instruction that meets the needs of talented learners (Hansen & Feldhusen, 1994). Curriculum and instructional adaptation requires the support of a specially trained coach at the building level, which could be embedded in the instructional facilitators recommended above (Reis et al, 1993; Reis & Purcell, 1993). Overall, learning outcomes for high ability learners are increased when they have access to programs whose staff have specialized training in working with high ability

learners (Delcourt, Loyd, Cornell & Golderberg, 1994), which could be accomplished with the professional development resources recommended below.

Research on gifted programs indicates that the effects on student achievement vary by the strategy of the intervention. Enriched classes for gifted and talented produce **effect sizes** of about +0.40 and accelerated classes for gifted and talented produce somewhat larger effectives sizes of **+0.90** (Kulik & Kulik, 1987; Kulik & Kulik, 1992; Gallagher, 1995).

Summary and Professional Judgment Panel findings. In summary, our understanding of the research on best practices in serving gifted and talented students is, at the elementary and middle school level, in the first instance, to place gifted students in special classes comprised of all gifted students and accelerate their instruction as such students can learn much more in a given time period than other students, and in the second instance when the pull out and acceleration approach is not possible, to have them skip grades in order to be exposed to accelerated instruction. Research shows that this generally does not produce social adjustment problems; indeed, many gifted students get bored and sometimes restless in classrooms that do not have accelerated instruction. Both of these strategies are essentially no cost, except for scheduling and training of teachers.

The primary approach to serve gifted students in high schools is to enroll them in advanced courses – advanced placement (AP), International Baccalaureate (IB) – to participate in dual enrollment in postsecondary institutions (which is already funded by Wyoming), or to have them take courses through the WEN's videos or other Internet-based distance learning mechanisms.

The Natrona School District is operating a program that reflects the best practices approach for elementary and middle schools– pull out and acceleration. Natrona has created

three accelerated classes for gifted children: a K-3 class, a grade 4-5 class and a grade 6-8 class, with the first two having about 16 students and the third about 21 students, all at the average funding for elementary and middle schools. This approach is essentially a no-cost approach, except possibly for some professional development for teachers (which can easily be accommodated within our professional development recommendations) and some supplies, which could be purchased with the $10/ADM state grant.

However, Natrona is able to have sufficient numbers of students for these accelerated classes for gifted students principally because of its large size, as it is the second largest school district in the state. Other districts have identified gifted students but do not have sufficient numbers of students to operate a full accelerated class at normal class sizes for such students.

Even though supported by research as the "next best" service approach, individuals in many Professional Judgment Panels did not like the grade-skipping approach for gifted students in elementary and middle schools where there were insufficient numbers of such students to organize special gifted and accelerated classes district wide. Thus, most districts that provided special services for gifted students did so through central office staff who traveled to different schools to provide enrichment and pull out services for the identified students. These programs roughly cost from $20/ADM to $100/ADM, with most of the programs costing between $75 and $100/ADM. Most districts also placed gifted high school students in AP or IB classes, or had them engage in post secondary dual enrollment.

Several panelists also said that their districts had gifted students enroll in advanced courses provided on the Internet, and that such courses were available for students at essentially all grade levels. Such approaches are very cost effective

Indeed, after the June 30-July 1, 2005 meeting of the Select Committee, we contacted directors of three of the Gifted and Talented research centers in the country: Dr. Elissa Brown, Director of the Center for Gifted Education, College of William & Mary; Dr. Joseph Renzulli, The National Research Center on the Gifted and Talented at the University of Connecticut; and Dr. Ann Robinson, Director of the Center for Gifted Education at the University of Arkansas at Little Rock.

The College of William and Mary Center was in the midst of developing a literature and best practices review, together with effect sizes of various approaches to serving the gifted and talented, and their relative costs. Their analyses, not yet published, showed that **effect sizes** for placing students into homogeneous classes of gifted students and accelerating instruction, as well as grade skipping, were between **0.5 and 1.0**. Their analyses further concluded that neither approach produced negative social or emotional impacts for students, and many times, enhanced social and emotional adjustment. In addition, they ranked these approaches high to low impact and high to low cost. Their analyses showed that enrichment programs, in which staff worked with gifted students in smaller groups, could have nearly the same high level effects but were more costly, thus ranking these approaches high impact and medium cost, while the accelerated classes and grade skipping were ranked high impact and low cost.

Dr. Ann Robinson of the University of Arkansas, Little Rock agreed with all these points.

The University of Connecticut center also basically agreed with these conclusions and had also developed a very powerful Internet-based platform that could provide for a wide range of programs and services for gifted and talented students. Named Renzulli Learning, the system takes students through about a 25-30 minute detailed assessment of their interests and abilities, which produces an individual profile for the student. The student is then directed, via a search

engine, to 14 different Internet data systems, including interactive web-sites and simulations that provide a wide range of opportunities to engage the student's interests. Renzulli stated that such an approach was undoubtedly the future for the very bright student. The estimated retail cost of this program is $25 per pupil but the director said that they would be very interested in negotiating a lower figure if the state of Wyoming were to adopt this program for statewide use.

Finally, at the August 23rd meeting of the Select Committee, Dr. Annette Bohling, Deputy Superintendent of Public Instruction, stated that Wyoming had based many of its strategies for gifted and talented students on the Renzulli philosophy, and suggested that providing funds for districts to use the Renzulli Learning system would be fully aligned with the state's educational directions.

Recommendation. We recommend that the needs of Wyoming's gifted students be met. In particular, we would suggest that the state do what is necessary to insure that best practices are used to serve gifted and talented students.

The state could develop rules and regulations about appropriate services for gifted students, which would say that the preferred approach is placement of gifted students in homogeneous accelerated classes, as Natrona is doing, the secondary approach is grade skipping for districts not large enough to create accelerated classes of around 16 elementary students and 21 secondary students, and that the tertiary approach could be online courses, such as the Connecticut Renzulli Learning Program. All but the latter could be funded by the current $10/ADM grant, and the latter would need less than $25 per pupil if the state negotiated a deal for statewide use.

In order to allow all districts to access the Renzulli Learning model, we recommend the state increase its per pupil amount for gifted and talented programs from $10/pupil to $25/pupil. The Committee approved this recommendation at the August 23rd meeting.

In addition to these funds, several proposals already made are directly related to appropriate servicing of gifted and talented students, such as intensive professional development. Curriculum acceleration, moreover, requires more deliberate student placement and scheduling than more resources. Further, several proposals, which might not have a specific rationale for gifted and talented students, nevertheless will positively impact them. These include:

- Classes of 16 students in grades K-3
- Classes of 21 in grades 4-12
- Small school size so a more personalized learning environment would help the teacher identity and respond to gifted student needs
- Intensive professional development that over time should include skills to differentiate instruction for the needs of all children, including the top learners
- Improved classroom instruction that focuses on ambitious learning goals and learning to understanding.

E3. Vocational Education

In 2001, the Wyoming Supreme Court ruled that basing vocational funding on average statewide education expenditures penalized schools with extensive programs. The Court ordered the state to develop a procedure for distributing resources to account for the increased cost of providing vocational education and to recognize variation among schools in the intensity of services provided.

The Current Model has the following characteristics:

– *Compensates for the additional cost of providing vocational education.* The current model assigns an extra weight of 0.29 to FTE vocational students to compensate districts

for the higher cost of staffing vocational classrooms, which are on average smaller than other courses (average of 13.0 pupil/staff ratio including vocational courses vs. a 16.7 pupil/staff ratio counting just non-vocational courses).

- *Adjusts for differences in student participation across districts.* The current model reimburses districts based on the actual number of students participating in vocational coursework, which may be due to a variety of district factors, including differences in district educational philosophies, regional economics, and local preference for services.
- *Provides separate funding for vocational equipment and supplies.* The current model provides funds for vocational equipment ($1,307) and supplies ($4,822) based on the number of FTE vocational instructors within a district, with funding based on average statewide equipment and supply expenditures for the 2001-02 school year. Supplemental funding is also provided (equal to 50 percent of 2001-02 equipment expenditures) to replace obsolete equipment. Total supplemental funding from these three programs equals $6,783 per vocational education teacher.

We conclude that these elements respond appropriately to the 2001 court mandate.

In addition, the current system:

- *Ensures that small schools are able to offer quality services.* The current system applies supplemental weighting to FTE vocational students attending schools with fewer than 131 ADM students to ensure that small schools can offer a two-program minimum. Given the more generous staffing provided by our recommendations for the high school prototypes, particularly small high schools, we conclude that this adjustment is no longer required.

– *Accounts for vocational program start-up costs.* The current system provides separate funding, via a competitive grant program, to support districts in introducing new programs.

In short, the current approach to vocational education funding is to count all students in vocational education programs, convert them to an FTE figure, provide them an extra weight of 0.29 to trigger additional teacher resources, and provide an additional sum of money per FTE vocational education teacher for equipment and supplies for vocational education programs. The additional FTE students are divided by 21, the class size figure that determines high school teachers. A total of 30 FTE vocational students would produce (30/21) times 0.29, or 0.41 additional teachers. If the school had a total of 4 vocational education teachers, it would receive the additional resources for materials and equipment for each of the four teachers. These elements both recognize the variation in vocational education services that districts provide and cover the extra costs (smaller class sizes and more expensive equipment) for vocational education programs. The State Board of Education has adopted rules, regulations and procedures to guide schools in the reporting of accurate FTE vocational education student and teacher counts.

In addition to high school vocational education programs, several individuals in the Professional Judgment Panels stated that they were providing a variety of vocational education programs in middle schools and that additional resources were needed for those programs. However, the 2002 vocational education study addressed the issue of whether there were additional costs for middle school vocational education programs, and concluded that there were not (Klein, Hoachlander, Bugarin & Medrich, 2002, p. 15). Thus, we do not recommend that additional resources be provided for middle school vocational education programs.

Recommendation**:** *We recommend that vocational education funding be changed to the above formula, and the current hold harmless and references to state average vocational education services/costs be dropped*.

Thus, for vocational education funding, we recommend that state take each high schools' FTE vocational education student count, apply an extra weight of 0.29 to that ADM figure to trigger an additional vocational education ADM figure, and then divide that additional ADM figure by 21, the high school class size, to determine the additional teachers that would be provided. We also recommend that a total of $7,731 be provided for every approved vocational education teacher in the high school for equipment, supplies, and for equipment replacement. The competitive grants for startup costs of new programs should also be continued.

The Committee approved this recommendation at its June 30-July 1, 2005 meeting.

F. Student Activities

Current Wyoming Block Grant. The Wyoming cost-based block grant funding model provides extra-duty funds within the line item for student activities. It provides $15.78, $102.81 and $311.28 per pupil for elementary, middle and high schools, respectively.

The Evidence. Elementary, middle and high schools typically provide an array of after-school programs, from clubs, bands, and other activities to sports. Teachers supervising or coaching in these activities usually receive small stipends for these extra duties. Further, research shows, particularly at the secondary level, that students engaged in these activities tend to perform better academically than students not so engaged, though too much extra curricular activity can be a detriment to academic learning (Committee on Increasing High School Students' Engagement and Motivation to Learn, 2004; Steinberg, 1997).

At the June Professional Judgment Panels, individuals in all panels made the point that the resources for student activities were substantially below what schools actually spend on those activities. Several panelists had figures from 2003-2004 showing that the total reimbursement from the state funding formula for student activities totaled about $12.9 million, whereas actual expenditures totaled $20.2 million, or $7.3 million more. The differences were primarily in secondary student activities expenditures, as the following chart shows (data taken from the documents provided to us):

Grade Level	Reimbursement Rate	Actual Expenditures Per ADM
K-5	$15.78	$17.95
6-8	$102.81	$227.63
9-12	$311.28	$561.37
Overall Total/Average	$135.19	$250.23

At its June 30-July 1, 2005 meeting, the Select Committee discussed various ways for increasing the resources for student activities. Although providing each district $250/pupil for student activities at all grade levels would bring the total dollars to what is actually spent, additional printouts of student activities expenditures per pupil by district showed that there were wide variations in such expenditures, with the largest expenditures in the smallest districts, most of which were in the Western part of the state.

Thus, the consultants were asked to develop a student activities expenditure curve that could be used to provide future resources so that the state figures more closely followed the actual expenditure needs in the different districts.

Regression analysis of current student activities spending per ADM for those schools reporting student activity expenditures in 2003-04 was used. Surprisingly, several schools reported no expenditures in this category. Further, actual expenditures per pupil varied widely, both across school sizes and among schools of similar size.

Regression coefficients were used to estimate student activity revenue for schools with ADM from 0.1 up to the largest prototype (288 for elementary, 315 for middle school and 630 for high school). In all cases the amount for schools at or near the prototype size was approximate to the average actual expenditure for schools at that level (elementary, middle school or high school). For all school levels, the per ADM amount calculated for the largest prototype size was used as the minimum per ADM amount for schools larger than the prototypical size.

The resultant per ADM revenue amounts are summarized below:

	Average	Maximum	Minimum
Elementary	$29.51	$50.16	$23.63
Middle	$322.52	$2,506.18	$264.07
High	$620.87	$2,737.39	$561.88

This model generated a total of $24.2 million in revenues for student activities. This is nearly twice the state reimbursement of $12.9 million that has been reported and about $4.0 million more than current reported expenditures. The bulk of the increase was at the middle and high school levels. Actual expenditures may be under reported if schools failed to report student activity expenditures in 2003-04. It is unclear why so many schools did not report any current spending on student activities and we do not have the data at this time to determine if this is a reporting problem or if schools are possibly using these revenues for other purposes.

The following summarizes the funding model for each school level.

Current funding and expenditures for elementary schools

The current model provides $15.78 per K-5 ADM for elementary student activities. In 2003-04, 118 out of 223 schools reporting ADM in grades K-5 also reported general fund expenditures for elementary student activities (function 1410) totaling $602,204. The simple average for current expenditures per ADM for K-5 activities was $23.76 and ranged from $0.08 to $228.63 per ADM.

Regression-based elementary model

The regression model generated per ADM revenues that averaged $29.51 per ADM and ranged from $50.16 for schools with fewer than one K-5 ADM to $23.63 at the prototype size of 288 ADM. The new model generated $697,647 in revenues for the 118 schools reporting expenditures in 2003-04 and a total of $1,082,609 when applied to all schools reporting K-5 ADM.

Current funding and expenditures for middle schools

The current formula provides $102.81 per 6-8 ADM for middle school student activities. In 2003-04, 78 out of 199 schools reporting ADM in grades 6-8 also reported general fund

expenditures for middle school student activities (function 1420) totaling $4,699,064. The simple average for current expenditures per ADM for 6-8 activities was $287.49 and ranged from $28.18 to $1,151.01 per ADM.

Regression-based middle school model

At the middle school level the regression model generated per ADM revenues that averaged $322.52 per ADM and ranged from $2,506.18 for schools with less than one 6-8 ADM to $264.07 at the prototype size of 315 ADM. The new model generated $4,735,964 in revenues for the 78 schools reporting actual expenditures in 2003-04 and a total of $6,657,743 when applied to all schools reporting 6-8 ADM.

Current funding and expenditures for high schools

Current funding equaled $311.28 per 9-12 ADM for high school student activities. In 2003-04, 72 out of 91 schools reporting ADM in grades 9-12 also reported general fund expenditures for high school student activities (function 1430) totaling $14,901,709. The simple average for current expenditures per ADM for 9-12 activities was $636.90 and ranged from $12.81 to $2,424.14 per ADM.

Regression-based high school model

The high school regression model generated per ADM revenues that averaged $620.87 per ADM and ranged from $2,737.39 for schools with fewer than one 9-12 ADM to $561.88 at the prototype size of 630 ADM. The new model generated $14,321,687 in revenues for the 72 schools reporting actual expenditures in 2003-04 and a total of $16,481,145 when applied to all schools reporting 9-12 ADM.

Recommendation. Given the wide variation in actual spending per pupil, and the fact that many schools reported no expenditures in this category, we recommend that the Committee

simply increase the dollar figures in this category to some statewide, district average amount until a more detailed analysis can be conducted of why such expenditures vary so dramatically. Providing each district $250 per ADM in this interim time period would boost state funding on average to a level that covered current, actual reported expenditures until a different cost based formula, relying on factors that are behind variations in spending, can be designed.

The Committee approved this recommendation at its August 23rd meeting.

G. Intensive Professional Development[16]

Current Wyoming Block Grant. The current funding system provides for $104.22 per ADM in elementary and middle schools and $113.29 per ADM at the high school level for professional development services, according to the October 2003 recalibration report (Hayward, Smith, Seder & Ehlers, 2003).

The Evidence. All school faculties need **ongoing professional development**. Indeed, improving teacher effectiveness through high-quality professional development is arguably as important as all of the other resource strategies identified. Better instruction is the key aspect of the education system that will improve student learning (Rowan, Correnti & Miller, 2002; Sanders & Horn, 1994; Sanders & Rivers, 1996; Webster, Mendro, Orsak & Weerasinghe, 1998).

Moreover, all of the resources recommended in this report need to be transformed into high-quality instruction in order to produce significant increases in student learning (Cohen, Raudenbusch & Ball, 2002). The most powerful means for bringing about this transformation is effective professional development. Further, as we have stated many times, while the key focus of professional development is for better instruction in the core subjects of mathematics, reading/language arts (including early reading assessment and instruction), history, and science,

[16] This draws from Odden, Archibald, Fermanich & Gallagher, 2002.

professional development resources must also adequately address other important school priorities such as the instructional needs of gifted and talented and English language learning students, embedding technology in the curriculum, high-quality primary school foreign language instruction, and school leadership as well. Finally, all beginning teachers need intensive professional development, first in classroom management, organization and student discipline, and then in instruction.

Fortunately, there is recent and substantial research on the structure of effective professional development that can be used to determine its costs (e.g., Elmore, 2002; Joyce & Showers, 2002; Miles, Odden, Archibald, Fermanich & Gallagher, 2004). Effective professional development is defined as professional development that produces changes in teachers' classroom-based instructional practice, which can be linked to improvements in student learning. The practices and principles researchers and professional development organizations use to characterize "high quality" or "effective" professional development draw upon a series of empirical research studies that linked program strategies to changes in teachers' instructional practice and subsequent increases in student achievement. These studies include, among others, the long-term efforts of Bruce Joyce (Joyce & Calhoun, 1996; Joyce & Showers, 2002), research on the change process (Fullan, 2002), a longitudinal analysis of efforts to improve mathematics in California (Cohen & Hill, 2001), Elmore's study of District #2 in New York City (Elmore & Burney, 1999), the Consortium for Policy Research in Education longitudinal study of sustained professional development provided by the Merck Institute for Science Education (Supovitz & Turner, 2000), studies of comprehensive professional development to improve science teaching and learning (Loucks-Horsley, Love, Stiles, Mundry & Hewsen, 2003), and an evaluation of the

federal Eisenhower mathematics and science professional development program (Garet, Birman, Porter, Desimone & Herman, 1999).

Combined, these studies identified six structural features of effective professional development:

1) The **form** of the activity – that is, whether the activity is organized as a study group, teacher network, mentoring collaborative, committee or curriculum development group. The above research suggests that effective professional development should be school-based, job-embedded and focused on the curriculum taught rather than a one-day workshop.

2) The **duration** of the activity, including the total number of contact hours that participants are expected to spend in the activity, as well as the span of time over which the activity takes place. The above research has shown the importance of continuous, ongoing, long-term professional development that totals a substantial number of hours each year, at least 100 hours and closer to 200 hours.

3) The degree to which the activity emphasizes the **collective participation** of teachers from the same school, department, or grade level. The above research suggests that effective professional development should be organized around groups of teachers from a school that over time includes the entire faculty (e.g., Garet, Birman, Porter, Desimone & Herman, 1999).

4) The degree to which the activity has a **content focus** – that is, the degree to which the activity is focused on improving and deepening teachers' content knowledge as well as how students learn that content. The above research concludes that teachers need to know well the content they teach, need to know common student miscues or problems students typically have learning that content, and effective instructional strategies linking the two (Bransford, Brown & Cocking, 1999; Kennedy, 1998).

5) The extent to which the activity offers opportunities for **active learning**, such as opportunities for teachers to become engaged in the meaningful analysis of teaching and learning; for example, by scoring student work or developing and "perfecting" a standards-based curriculum unit. The above research has shown that professional development is most effective when it includes opportunities for teachers to work directly on incorporating the new techniques into their instructional practice with the help of instructional coaches (e.g., Joyce & Showers, 2002).

6) The degree to which the activity promotes **coherence** in teachers' professional development, by aligning professional development to other key parts of the education system such as student content and performance standards, teacher evaluation, school and district goals, and the development of a professional

community. The above research supports tying professional development to a comprehensive, inter-related change process focused on improving student learning.

Form, duration, and active learning together imply that effective professional development includes some initial learning (*e.g.*, a two-week or ten-day summer training institute) as well as considerable longer-term work in which teachers incorporate the new methodologies into their actual classroom practice. Active learning implies some degree of coaching during regular school hours to help the teacher incorporate new strategies into his/her normal instructional practices. It should be clear that the longer the duration, and the greater the coaching, the more time is required of teachers as well as professional development trainers and coaches. Content focus means that effective professional development focuses largely on subject matter knowledge, what is known about how students learn that subject, and how to teach the actual curriculum that is used in the school. Collective participation implies that the best professional development includes groups of, and at some point, all teachers in a school, who then work together to implement the new strategies, and in the process, help build a professional school community. Coherence suggests that the professional development is more effective when the signals from the policy environment (federal, state, district, and school) reinforce rather than contradict one another or send multiple, confusing messages. Coherence also implies that professional development opportunities should be given as part of implementation of new curriculum and instructional approaches. Note that there is little support in this research for the development of individually oriented professional development plans; the research implies a much more systemic and school-wide approach.

Each of these six structural features has cost implications. Form, duration, collective participation, and active learning require various amounts of both teacher and trainer/coach/mentor time, during the regular school day and year and, depending on the specific

strategies, outside of the regular day and year as well. This time costs money. Further, all professional development strategies require some amount of administration, materials and supplies, and miscellaneous financial support for travel and fees. Both the above programmatic features and the specifics of their cost implications are helpful to comprehensively describe specific professional development programs and their related costs.

From this research on the features of effective professional development, we conclude that the resources needed to deploy this kind of professional development, which is key to transforming all the resources in the prototypical schools into student learning, are:

a. Time during the summer for intensive training institutes. This training can most easily be accomplished by ensuring that approximately 10 days of the teacher's normal work year will be dedicated to professional development. Due to the fact that the best estimate of the current average number of annual teacher work days in Wyoming is about 181 (with 173 for teaching) and includes about 5 days for professional development, this recommendation requires an increase of 5 days, to produce the minimum number of 10 days for intensive training.

b. **On-site coaching for all teachers** to help them incorporate new practices into their instructional repertoire. *The instructional facilitators provided for and described earlier in this report would provide this function*.

The impact of coaches as part of the professional development program is very large. Joyce and Calhoun (1996) and Joyce and Showers (2002) found that when teachers had sufficient time to engage in professional development that was embedded in classrooms with the aid of instructional coaches, teacher practice changed significantly, with effect sizes of 1.68 in the transfer of training to classrooms, 1.25 for skill-level objectives, and 2.71 for knowledge-level objectives. Effects were almost negligible without the classroom based coaching.

c. Collaborative work with teachers in their schools during planning and preparation periods to improve the curriculum and instructional program, thus reinforcing the strategic and instrumental need for planning and preparation time during the regular school day. This will require smart scheduling of teachers during the regular school day and week.

d. Funds for training during the summer and for ongoing training during the school year, the cost of which is about $30,000 for a school unit of 300 students, or $100/pupil.

Recommendation. For professional development we recommend:

- The number of teacher days should be extended by 5 days to provide a total of 10 days for intensive summer institutes
- The instructional facilitators included above would provide the instructional coaching
- Collaborative work should be conducted during the planning and preparation time that is included above
- An additional $100 per student, or about $28,800 in the prototypical elementary school, $31,500 in the prototypical middle school and $63,000 for the prototypical high school, would be needed for trainer and other miscellaneous professional development costs.

The Committee approved this recommendation at its June 30-July 1 meeting.

These professional development resources should be adequate for all professional development needs of all teachers, including better instruction in the core subjects of mathematics, reading/language arts (including early reading assessment and instruction), history, and science, the instructional needs for gifted and talented and English language learning students, for embedding technology in the curriculum, assessment and for primary school foreign language teaching.

We also note that in developing the recommendations to this point, we have "rolled" current resources provided by the Reading Assistance and Intervention Program – now provided outside of the Block Grant – into the Block Grant, so this program would no longer need to be funded as a stand alone program.

H. Assessment

Wyoming is developing a new and quite sophisticated student testing system and has several requirements in place for local district testing systems. The issue for the recalibration effort is whether additional resources, beyond those already in the system and those recommended above, are needed for schools and districts to meet the state requirements for local testing and assessments. To answer that question, we need to briefly summarize a number of issues related to testing and assessment requirements.

First, the state has developed content and performance standards in nine content areas related to the Education Basket. These areas, called the common core of knowledge and skills, include: Language arts/reading/writing, mathematics, science, social studies, fine and performing arts, foreign language, health, physical education, and career and vocational education. District and school curricula and courses are to cover all these standards.

Second, the state requires all districts to have a K-12 testing system that can be used to assess student proficiency in these nine areas.

Third, the state has developed minimum high school graduation standards that require 4 years of language arts, and three years each of mathematics, science and social studies.

Fourth, and related, each high school diploma will have an "endorsement" that indicates the student's performance in the nine content areas. An "advanced" endorsement is provided if the student demonstrates "advanced" performance in a majority of the nine common core of

knowledge and skills areas, a "comprehensive" endorsement is provided if the student demonstrates "proficient" performance in a all of the nine common core of knowledge and skills areas, and a "general" endorsement is provided if the student demonstrates "proficient" performance in a majority of the nine common core of knowledge and skills areas. Student performance in these areas is to be included in the Body of Evidence that each district and high school is to create for each student.

In order to respond positively and adequately to these requirements, each district needs to ensure that:

1. Curriculum and courses of study at all levels cover the required core content and skills areas. It should be noted that Wyoming districts have had to meet this requirement for several years, even before the most recent high school graduation requirements that are linked to the Body of Evidence.
2. The K-12 testing and assessment system provides sufficient data to identify student performance in the content and skills areas.
3. Sufficient data are available for the Body of Evidence so the endorsement for the high school diploma can be determined.

The Comprehensive 2003 Wyoming Assessment Handbook identifies the requirements that districts must meet as well as several alternative options for meeting these requirements.

In discussions with the leaders of the curriculum and testing units in the Wyoming Department of Education, as well as other Wyoming education leaders, we were told that the requirement that all high school students take four years of language arts, and three years each of mathematics, science and social studies provides adequate opportunity for those courses to cover all the standards in those four content areas and for those courses to have embedded assessments

that could be used to determine student performance in those content areas. We also learned that it is possible to cover all the fine and performing arts standards in one year-long class (with multiple formats); to cover all the standards in foreign language in, at the most, two years and that many districts covered those standards in one year; and that the health, physical education and career/vocational technical standards can also be covered in one year-long class each. Put another way, over the four years of a high school program, all the standards for high school graduation could be covered adequately in 18-19 high school year-long classes. To be sure, most students would want to take more classes, but this is what is needed to be minimally adequate.

This means that a high school schedule of six periods a day, which would have students taking 24 courses over a four year time period, would provide adequate opportunity for students to take a sufficient number of courses to cover all the core knowledge and skills areas. And, a student seeking to enroll at the University of Wyoming, or other top quality post secondary institutions, could take four years each of language arts, mathematics, science and social studies, plus four years of a foreign language, plus one year of health, PE, fine and performing arts, and career/vocational education during their high school career. Obviously, high schools that had seven or eight period days would also offer sufficient numbers of courses, 28 and 32 respectively, for students to meet the core proficiency standards. In other words, a six, seven or eight period high school schedule would be able to accommodate all the high school proficiency standards and course requirements now required by the state as well as the coursework commonly associated with admission to top colleges and universities across the nation.

The primary question for determining an adequate level of funding for district assessments is whether there are sufficient resources for developing a local assessment system that provides valid and reliable testing information to determine student performance in these

areas. This has the potential to be a very complicated and expensive initiative, but current and planned Wyoming Department of Education initiatives are designed to resolve local school districts' challenges in meeting their K-12 testing and high school Body of Evidence requirements in a cost effective and more valid and reliable manner. *In summary, the state's plan is to create an on-line testing system that can be used at the local level for all state testing and assessment requirements, and our professional judgment is that this provides a cost effective and quality approach to this task. Further, the state will provide additional assessments that local districts can use to augment the above more formal assessments. Finally, the state plans to continue the collaborative professional development on assessment literacy to enhance the ability of local teachers and administrators to use assessment data to improve instructional practice.* The system is designed as follows:

1. The new assessments for Wyoming Students, (PAWS) testing system, which is valid and reliable at the individual student level, provides results for reading, writing and mathematics in grades 3-8, and 11. In addition, a science test for grades 4, 8 and 11 will be available for the 2007-08 school year. The grade 11 proficiency requirements could be met by students taking part or all of the test components in grades 9 and 10, so they will have multiple opportunities to meet the proficiency requirements before the "last" administration of the test in April of their 11th year of school. The results can be used both for the Body of Evidence and for determining proficiency in reading, writing and mathematics for grades 3-8.
2. The state is providing all districts with the Early Reading and Diagnostic Assessment (ERDA) for assessing student proficiency in reading and writing in grades K-2. The

results from these assessments both inform teachers about student literacy and provide data for improving the reading instructional program.

3. The state is developing an "item bank" that can be used in an on-line testing system for districts to assess proficiency in the other five content areas: health, physical education, fine and performing arts, career/vocational technical and foreign language. These items will be available on the online system called WEdGate. The items for health and physical education have already been developed. Moreover, the Wyoming Education Gateway, (WEdGate) http://wyoming.edgate.org/index.php includes a student tracking system that will facilitate each district's tracking of the proficiency of each student in all the various testing areas. Finally, the state is developing an assessment for students with severe cognitive disabilities and English language learning needs.
4. The state also will provide to districts, free of charge, reading assessments for grades K-3, reading, mathematics and science assessments for grades 3-8, and writing assessments for grades 3-12. These assessments can be used locally for additional assessment purposes and represent essentially an assessment system in addition to those included in PAWS and WEdGate.

This means that the state of Wyoming already is providing, or intends to provide in the near future, the primary valid and reliable testing and assessments that are required for the K-12 testing system and the Body of Evidence. To be sure, districts can develop additional or supplemental tests and assessments on their own, or through consortia, including end of course examinations in high school. But the bottom line is that the state will provide all the elements of a testing and assessment system that local districts and schools will need to comply with state

requirements. The implication is that additional resources for assessment are would not be required for the school finance system.

What is needed, however, is adequate professional development for how to use the evolving state testing and assessment system as well as to continue the work on developing and disseminating performance assessments, and developing expertise to use assessment data to enhance and improve instructional practice. For these objectives, the recommendations for professional development included above can be used to develop assessment literacy and expertise in using assessment data to enhance instructional practice.

However, it would be wise for the state to supplement the district- and school-based professional development resources recommended above with a state capacity to deliver some additional professional development on these issues and to support consortia of school districts working on assessment issues together. In this light, we would recommend that the state continue to provide the Department of Education with the approximately $500,000 that has been used in the past to work with local districts and consortia of districts on assessment related issues. One result of this collaborative work in the past has been the creation of 62 performance tasks that have been and continue to be disseminated across the state. This work has not been completed, and sustained appropriations of this amount of money would enable the Department to continue its collaborative work with local districts on assessment issues, specifically on the topic of how to use assessment data to improve instructional practice at all levels in the system.

Finally, if the state's WEdGate system, together with PAWS and ERDA are the core of the local testing and assessment system, schools and districts will need sufficient technology to provide access to the on-line testing and student tracking system. We conclude that there are

sufficient technology resources provided in the recommendation for equipment and technology for this objective.

Recommendation: It is our opinion that the primary issue for future local assessment activities is to continue the professional development activities that help local educators create and use assessments for the dual purposes of measuring student progress and improving instructional practice. To that end, the bulk of such professional development resources are included in the recommendations for professional development included above. These recommendations include more days during the year for teachers to have training, school-based instructional coaches to help teachers embed new practices into their instructional repertoire, and time during the day for job embedded professional development. One powerful strategy for the last of these is examining student assessment results to assess instructional impact and make instructional change. In addition to the substantial resources for professional development recommended elsewhere in this document, we recommend continuing the approximately $500,000 now available to the WDE to work with local districts, and consortia of districts, on assessment-instructional issues. In addition, we recommend that the state retain the current $25/ADM (inflation adjusted) currently provided for local assessment issues.

These recommendations are premised on the state's completing and maintaining the PAWS testing system in reading, writing and mathematics for grades 3-8 and 11, science in grades 4, 8 and 11, as well as the assessment for students with severe cognitive disabilities and English language learning needs, the ERDA testing and assessment system for reading and writing in grades K-2, and the WEdGate system and its related item bank and student tracking system for foreign language, fine and performing arts, health, physical education, and career/vocational technical education.

The Committee approved this recommendation at its August 23rd meeting.

I. District Operations

The following three sections address District Operations that are included in the Block Grant: Operations and Maintenance; Central Office administration; and Transportation.

I1. Operations and Maintenance

Current Wyoming Block Grant: The Wyoming Supreme Court held in *Campbell II* that the costs of routine maintenance and operation, including utility cost, be determined by either:

1) A formula that recognizes enrollment measured by ADM, building square footage, and number of buildings in the district; or
2) Full reimbursement of actual costs, subject to state oversight.

The Current Wyoming Block Grant formula for maintenance and operations is an intricate formula that incorporates the criteria set by the Court. The formula considers both education and non-education space for maintenance and operations and is calculated through several steps.

- Education space between 100 percent and 125 percent of the state's education space allowance is funded at a flat-rate amount per square foot. Standard education capacity allowance is the calculated square-foot allocation per student: 120 square feet for elementary, 150 square feet for middle, and 180 square feet for high school students.
- Education space in excess of 125 percent of state standard capacity is funded at a declining rate to a maximum allowance of 200 percent of state standard capacity. This cap was lowered to 135 percent in 2004, will decline to 125 percent for the 2006-07 school year and will finally drop to 115 percent in 2009-10.
- Non-education space is additional facility space necessary for normal school district operations (bus barns, administration buildings, storage facilities, etc.). The first 10 percent of non-education space is funded at the same flat-rate amount as education space.

- Non-education space beyond the 10 percent criterion for major maintenance (but not to exceed 20 percent) is funded in a declining amount per square foot, similar to the formula for education space.
- The rule that applies to major maintenance represents the greater of 10 percent of the actual education space or 10 percent of the state standard for education space. The goal is to avoid penalizing districts that have little non-education space.

The Evidence: The current model provides funding on the basis of square footage which is assumed to provide adequate funds to pay for all maintenance and operations costs as well as utility costs.

Maintenance and operations can reasonably be considered to include three separate district expenditure functions: custodial, maintenance and groundskeepers, materials and supplies, and the costs of utilities. Each is considered below including a description of how they could be factored directly into the recalibrated prototype models.

Custodians: Today, most school districts across the United States rely on a relatively simple model for custodial staffing. The model can be summarized as:

[(Actual Students + Actual Inside Building Square Footage)/2 x (8) hours].

Cafeterias/multipurpose rooms, lockers and shower cleaning as well as food services related activities are generally considered extra responsibilities and not included in the formula. Custodial workers' duties are time-sensitive, are structured and varied. Zureich (1998) estimates the time devoted to various custodial duties:

- Daily duties (sweep and vacuum classroom floors; empty trash can and pencil sharpeners in each classroom; clean one sink with faucet; and, security of room), which take approximately 12 minutes per classroom.

- Weekly duties (dust reachable surfaces; dust chalk trays and clean doors; clean student desk tops; clean sink counters and spots on floors; and, dust chalk/white boards and trays), each of which adds 5 minutes a day per classroom.

- In addition to these services, non-cleaning services (approximately 145 minutes per day) provided by custodians include: opening school (checking for vandalism, safety and maintenance concerns), playground and field inspection, miscellaneous duties (teacher/site-manager requests, activity set-ups, repairing furniture and equipment, ordering and delivering supplies), and putting up the Flag and PE equipment.

A formula that takes into consideration these cleaning and non-cleaning duties has been developed and updated by Nelli (forthcoming). The formula takes into account teachers, students, classrooms and Gross Square Feet (GSF) in the school. The formula is:

- 1 Custodian for every 13 teachers, plus
- 1 Custodian for every 325 students, plus
- 1 Custodian for every 13 classrooms, plus
- 1 Custodian for every 18,000 Gross Square Feet (GSF), and
- The total is divided by 4.

The formula provides a numeric equivalent of the number of custodians needed at prototypical schools. The advantage of using all four factors in estimating the number of custodians needed is it will accommodate growth or decline in enrollment and continue to provide the school with adequate coverage for custodial services over time.

For example, the prototypical elementary school has a total of 21.6 classroom teachers and specialists, and one would assume about 21 classrooms (assuming the 3.6 specialists generally would have their own classrooms). The Facilities Commission's design standards for schools (Wyoming School Facilities Commission, 2003) rely on a varying level of GSF per student depending on the school's enrollment. For a school of 288 students the standards call for

150 GSF leading to 43,200 GSF in the building. Therefore, the number of custodians required for a prototypical elementary school of 288 students would be computed as follows:

- Teachers: 21.6/13 = 1.6615
- Students: 288/325 = 0.8862
- Classrooms: 21/13 = 1.6154
- GSF: 43,200/18,000 = 2.4

= 6.5631 / 4

= **1.64 Custodians (Elementary)**

A prototypical middle school of 315 students would have 18 teachers and specialist teachers and likely 18 classrooms (as specialists are more likely to need their own rooms to meet classes). Using the Facility Commission's GSF standard of 195 square feet per pupil there would be 58,500 square feet in the school. This would lead to the following computation for custodians:

- Teachers: 18/13 = 1.3846
- Students: 315/325 = 0.9692
- Classrooms 18/13 = 1.3846
- GSF: 58,500/18,000 = 3.2500

= 6.9884 / 4

= **1.75 Custodians (Middle School)**

A prototypical high school of 630 students would have 36 teachers and likely 36 classrooms (as specialists are more likely to need their own rooms to meet classes). Using the School Facility Commission's GSF standard of 180 square feet per pupil there would be 108,000 square feet in the school. This would lead to the following computation for custodians:

- Teachers: 36/13 = 2.7692
- Students: 630/325 = 1.9385
- Classrooms: 36/13 = 2.7692
- GSF: 108,000/18,000 = 6.0000

= 13.4769 / 4

= **3.37 Custodians (High School).**

We have used the above formulas to calculate custodians. If the number of custodians is less than 1.0 for any school with 50 or more students, the result is rounded up to 1.0. As noted in the section on small schools, custodians are included in the overall staffing for schools with 49 or fewer students. Finally, custodian FTEs for non-instructional space, such as district administrative offices, are generated by including in the gross square footage component of the formula an additional gross square footage amount equal to 10 percent of a district's total instructional gross square footage to estimate custodian need for non-instructional space.

A concern expressed at a number of the Professional Judgment Panels regarding the number of custodians focused on the number of evenings and hours beyond the regular school day that schools are open to the community, particularly at the secondary level. We believe this to be an important role for schools in each community and therefore want to insure adequate funding for custodial positions, however we also recognize that the funding model proposed above assumes that considerable custodial work takes place outside of the regular school day at the present time, meaning that if a means for contacting the custodian doing evening cleaning activities were possible, the school could be staffed and maintained with the existing custodial configuration suggested above, particularly since the model rounds up.

Many Professional Judgment Panel members felt this still was inadequate at the secondary level, therefore we recommend that an amount of money equal to payment for one-half of a custodial position be provided for each secondary school. These funds could be used to pay existing custodians overtime, or to hire a part-time custodial position to provide for the custodial needs of schools that have substantial activity programs in the evenings.

Maintenance Workers: Core tasks provided by maintenance workers include preventative maintenance, routine maintenance and emergency response activities. Individual maintenance worker accomplishment associated with core tasks are: (a) HVAC systems, HVAC equipment, and kitchen equipment; (b) Electrical systems, electrical equipment; (c) Plumbing systems, plumbing equipment; and, (d) Structural work, carpentry and general maintenance/repairs of buildings and equipment (Zureich, 1998).

There are some assumptions made about maintenance workers during their daily and weekly routines, mainly that:

- Individual maintenance workers buy supplies at local stores on their way to work in order to accomplish tasks
- Capital outlay work and deferred maintenance work is not done in-house but is subcontracted to private vendors
- All repair work and maintenance work completed in-house does not use subcontracting; and,
- A work year consists of 1,760 hours.

Zureich's (1998) final formula, however, has been updated to reflect evidence-based adequacy requirements (Nelli, forthcoming) including adjustments for individual school characteristics. The following adjustments have been incorporated into the funding model:

- It is assumed that the average age of buildings is 29.7 years old. Buildings less than 10 have a multiplication factor adjustment of 0.95 is made. Buildings older than 30 years have a 1.1 multiplication adjustment factor
- Total square footage is based on the state GSF standards per student for all levels (150 GSF per pupil x 288 ADM = Elementary School GSF; 195 GSF per pupil x 300 ADM = Middle School GSF; and, 180 GSF per pupil x 600 ADM = High School GSF);
- Elementary schools have a multiplication adjustment factor of 0.8.

The model also incorporates Zureich's (1998) adjustment for small districts (fewer than 1,000 ADM), under which the total number of maintenance workers is multiplied by an adjustment factor of 1.1.

Zureich (1998) recommends further adjustments that were not included in the model because the specific data required are not currently available. These adjustments include

- High Schools have a multiplication adjustment factor of 2.0
- Building conditions are assumed to be acceptable, but if buildings are in excellent condition than the total number of workers allocated to school sites is multiplied by an adjustment factor of 0.95. If the building(s) at the school site(s) are in unacceptable or poor condition, than the total number of maintenance workers allocated uses a multiplication adjustment factor of 1.2
- Adding 0.1 worker for every school site if custodians are not the initial service provides;
- Subtracting 0.05 workers from total per school site if supplies are not picked up by maintenance workers but picked up and delivered to schools directly by other means;

- If vandalism exceeds 10 percent of the total maintenance hours per school site, the number of hours spent in excess of 10 percent is divided by 1760 and added to the total number of workers required;
- If graffiti is in excess of 1 hour per site per week, then the number of excess hours spent removing graffiti in excess of 1 hour per week is divided by 1760 and the number is added to the total of workers required at the school site;
- Capital Outlay work conducted in-house adds 1 worker for every $30,000 in 1998 dollars (annually adjusted according to the WCLI);
- Deferred Maintenance work conducted in-house adds 1 worker for every $30,000 in 1998 dollars (annually adjusted according to the WCLI); and,
- One worker is subtracted from the total per school site for every $100,000 of maintenance work conducted by subcontractors in 1998 dollars (annually adjusted according to the WCLI);
- Travel time to school sites is estimated to be 10 minutes. If travel time is less than 5 minutes, than total workers is multiplied by a factor of 0.9. If travel time exceeds 20 minutes, total workers are multiplied by a factor of 1.1;
- The Journeyman Level workforce percentage is assumed to be 55 percent. If the journeyman workforce is greater than 20 but less than 40 percent, total workers allocated to each site is multiplied by an adjustment facto of 1.1. If the percentage of journeyman workforce is less than 20 percent, than the total number of workers allocated to each site is multiplied by a factor of 1.2.

Finally, Zureich (1998) recommends that for non-instructional facilities such as central offices, one worker is added if the school district has a district-wide energy monitoring system

for all HVACD equipment. The formula for maintenance worker FTEs incorporated into the funding model for instructional facilities then, is:

[(# of Buildings in District) x 1.1 + (GSF/60,000 SqFt) x 1.2 + (ADM/1,000) x 1.3 + General Fund Revenue/5,000,000) x 1.2] / 4 = Total number of Maintenance Workers needed.

Plugging in evidence-based adequacy requirements, and for purposes of illustration, the formulas are:

- [(1 Building x 1.1) + (43,000GSF/60,000 SqFt) x 1.2 + (288/1,000) x 1.3 + (General Fund/5,000,000) x 1.2] / 4 = Elementary Maintenance
- [(1 Building x 1.1) + (58,500GSF/60,000 SqFt) x 1.2 + (300/1,000) x 1.3 + (General Fund/5,000,000) x 1.2] / 4 = Middle School Maintenance
- [(1 Building x 1.1) + (108,000GSF/60,000 SqFt) x 1.2 + (600/1,000) x 1.3 + (General Fund/5,000,000) x 1.2] / 4 = High School Maintenance

The school-site and district level adjustments noted above are then made to the total FTEs generated through these formulas.

Note that if these formulas are used, then the support staff for maintenance and operations in the central office portion of this document would not be needed as they would be counted here.

Grounds Maintenance: The typical goals of a school grounds maintenance program are generally to provide safe, attractive, and economical grounds maintenance (Mutter, Davida, August 1996). *Landscapes for Learners* (George, Linda, 1996) suggests that an effective grounds keeping program includes the following objectives:

- Support classroom instruction and curriculum,
- Provide high quality recreation and educational space,

- Protect children from health risks,
- Empower children to take action by shaping their environment.

Grounds maintenance work can be performed through one of four configurations: 1) direct employment by the district, 2) private contracts, 3) volunteers, or 4) a combination of these approaches.

There are strengths and weaknesses of direct employment of grounds staff. Strengths include (a) the school is in control of context and timing of work performed, and (b) the school can have full commitment of its staff in terms of total quality control. Sports and amenity grounds maintenance areas are places where districts might consider the use of contractors, although in the Wyoming context, this approach might be more difficult given the low population density and the distances involved in travel to many school sites. Some contractors and community groups may offer assistance with wildlife habitat maintenance as well as curricular/classroom assistance. New landscape works may be desired and offered by specialized contractors. Volunteers also provide assistance with wildlife habitat maintenance and landscaping, but services are provided on a voluntary basis and work schedules cannot be guaranteed regardless of expertise, desire or experience (Wood & Littlewood, 1996). School ground landscape types can include: athletic fields, adventure play equipment, building entrances, (special) feature areas, hard surface areas, mini-ecosystems, school ground entrances, as well as other areas. Each landscape type can be specifically designed to meet the diverse needs of the school community (George, 1996).

A formal evaluation of a grounds maintenance program (Virginia Department of School Plants, 1996) conducted by the Chesapeake Public Schools in collaboration with independent auditor KPMG was able to break down roles, responsibilities and tasks performed by grounds

crew personnel. Personnel in Grounds Shops are responsible for lawn activities, including: 1) spraying herbicides, 2) preparing grounds for special events, and 3) cutting and maintaining grass every 12 days. Other maintenance activities usually performed by Grounds Shop personnel include:

- Landscaping grounds
- Grinding tree stumps and removal of dead trees
- Installing and maintaining playground equipment and playground areas
- Delivering and spreading mulch, topsoil, rock salt and gravel
- Ordering, installing and maintaining signs
- Installing and repairing fences
- Repairing potholes
- Building walkways
- Making minor concrete repairs
- Excavating underground utilities
- Cleaning and repairing storm drains
- Cleaning vandalism damage
- Maintaining and repairing sandpits, running tracks, wooden walks, benches and platforms
- Conducting drainage projects
- Picking up equipment from sites for annual repairs
- Other duties such as snow removal, graduation setup, delivery assistance, etc. as assigned.

It was estimated (Virginia Department of School Plants, 1996) that 31 staff hours per acre and 690 staff hours per site are needed to meet basic grounds care needs.[17] This breaks down to 86.25 days per site [690 hours / 8 hour working day] per crew. Grounds keeping positions for the school district included:

- 1 Shop Lead man (identified as Groundskeeper I),
- 13 FTE Groundskeepers (identified as Groundskeeper II),
- 10 Part-Time (seasonal) Groundskeepers (hired from April through November),
- 1 Equipment Maintenance Mechanic.

In this configuration, Groundskeepers II are assigned into crews of 3-4 persons, with each crew responsible for a different geographic zone within the school district. Each crew of Groundskeepers II has a Lead Member. It was noted (Virginia Department of School Plants, 1996) that training all Groundskeepers usually occurs "on the job" and is conducted by the Grounds Shop Lead person (Groundskeeper I) as well as Crew Lead Members. Equipment safety training is conducted by the Groundskeeper I.

The typical Grounds Crew organizational structure (Virginia Department of School Plants, 1996) includes a Crew Lead Member operating a riding mower and exercising flexibility in job and task configurations; crew members operating mowing trailers; and, temporary workers operating small hand tools. Grounds maintenance activity hours were found to range from 14 to 76 hours per acre. Lawn maintenance activity hours were found to range from 10 to 38 hours per acre. Typical Grounds Crew total days performing task categories are (Virginia Department of School Plants, 1996):

[17] This estimate was based on an analysis that included 26 elementary schools, 8 middle schools, 5 high schools, 12 centers and support buildings, 5 stadiums, and 2 vacant lots for a total of 58 properties and 1300 acres (Virginia Department of School Plants, August 1996).

- Lawn maintenance activities = 139.5 days per year per crew
- Other grounds maintenance activities = 64.7 days per year per crew
- Other winter activities = 43.3 days per year per crew
- Inclement weather activities = 12.5 days per year per crew
- Total = 260.0 days per year per crew.

Recent research sheds new light on grounds maintenance operations. Richard Webb (2003) found that the summer months are intense for school grounds maintenance crew members who must prepare for the fall semester and address both maintenance and renovation needs of natural grasses, synthetic fields, running tracks, and tennis courts. Natural grass surfacing requires a well-groomed playing surface for participant safety and effective play-activities. Grass cutting often requires rotational shifts in cutting height, style, and technique throughout the year; irregular schedules require seasonal adjustments as well. For water conservation purposes, annual irrigation audits may be performed, examining irrigation efficiency, turf-rooting depths, soil types, and watering requirements. Turf conditions need regular monitoring of weeds, insects and disease, turf compaction, proper aeration, seeding and topdressing. Synthetic field surfacing systems during the summer months require inspection and repair of tears and damaged areas; the fields must be cleaned according to specific manufacturer's recommendations. Tennis and track facilities require inspection and repair of accelerated water areas and cracking after summer recreational use is complete. Pavements may need to be resurfaced and /or rotating gates installed to direct traffic. In addition, Cathy Walker (2000) found that the winter months are considered planning time for grounds care managers, reviewing and assessing: equipment, staff, budget, schedules, and chemicals.

The Chesapeake Public Schools Division (Virginia Department of School Plants, 1996) also makes the following assumptions:

- Grounds personnel work 8 hour days
- Lunch takes an additional 0.5 hours
- Grounds crews arrive at school plants (Grounds Shop) by 7:30 am to get needed equipment and receive work orders
- Grounds Crew Teams consist of 4 members
- Crews are on the road traveling to sites by 7:45 am (within 15 minutes)
- Travel time to school takes 15 minutes (Crews arrive by 8:00 am, finish at 3:00 pm, pack up and return to shop by 3:30 pm)
- Crew members perform jobs as assigned at Grounds Shop and leave by 4:00 pm
- Crews work no more than 2 sites per day
- Infrequently, crews return to school plant (Grounds Shop) during middle of day for equipment repair needs
- Peak time for Grounds Shop is the growing season (April through November), where most time is spent in cutting and maintaining lawns leaving 1 hour per day devoted to other grounds activities assigned
- Growing season provides each crew with 3 temporary workers
- Grounds crew personnel assigned to assist shops, custodians and school instructional program as needed during inclement weather
- Winter season, because of weather, often brings erratic scheduling of duties and tasks, so temps may be needed for assistance on a case-by-case basis
- Workload is considered heavy during winter and summer months

- Crew member breaks are rotational during the day
- Grounds Shop Lead person (Groundskeeper I) checks each crew twice per day, enforcing time on task and providing assistance and supervision as needed
- Training, motivation to learn, and opportunities for advancement are important for improving the efficiency and effectiveness of crew member performance
- All tasks completed by crews but the quality of the final appearance of grounds tasks performed suffers and reflects need to reorganize tasks, schedules and trainings
- Temporary workers are helpful and often go beyond what is expected out of them stemming from hope the will be hired as Full-Time Equivalent Employees
- Some temporary workers have been employed with the school district for 10 or more years and may not receive any health benefits
- Equipment is borrowed (at a diminishing rate) from the Grounds Shop by other shops because other shops do not have proper equipment needed to haul materials
- Annual in-service (training) meetings conducted during winter months
- Outstanding crew members are recognized in meaningful ways.

For Wyoming, the following assumptions have been made regarding grounds keeping:

- A crew consists of 4 persons (one lead, two general workers, and one "hands-on" grounds keeping manager that travels to sites to monitor, assist, train, etc.)
- A total (average) of 31 staff hours per acre per site is required per year
- A total (average) of 690 staff hours per site per year is required per year
- The grounds keeping shop organizational structure is one groundskeeper I (Manager), one equipment mechanic, plus individual work crews determined to be the level of groundskeeper II where each work crew has one lead member

- A work year consists of 251 days (365 days minus 104 weekend days and minus another ten vacation days), and a work day consists of eight hours.

A theoretic example of a work crew's responsibility at various school levels in acres and days per year is expressed in the following table:

Facility Type	Crew Members	Site Acres	Days	Factor
Elementary School	3 Groundskeepers	16	62 days = [31 acre site hours x 16 acres / 8 hrs per day]	1.0
Middle School	3 Groundskeepers	24	93 days = [31 acre site hours x 24 acres / 8 hrs per day]	1.5
High School	3 Groundskeepers	40	155 days = [31 acre site hours x 40 acres / 8 hrs per day]	2.5

These factors can be used for each Wyoming school and school district to estimate the total number of Grounds staff needed grounds keeping.

Custodial and Maintenance Supplies: We recommend using an average of current expenditures per gross square foot currently in use. As with custodians, this allowance is applied to the gross square footage of school instructional space plus an additional 10 percent for non-instructional space. The figure for 2004-2005 was approximately $0.55 per gross square foot.

Utilities: After reviewing data on utilities costs and determining that some but not all utilities could be funded via a formula, we now recommend that resources for utilities for 2005-06 be the amount spent by each district on utilities in the previous year, 2004-05, and that this

figure be adjusted by the external cost adjustment for future years. We have made this recommendation for a number of reasons:

- The current model does not appear to clearly specify the necessary resources for utilities
- Past efforts to estimate an adequate cost based approach have met with concern and criticism
- There is substantial volatility and variation in utility costs across school districts, with little ability to predict their impact in the future
- School buildings across the state rely on different forms of energy to heat, cool and provide lighting, making a standardized model for allocation of funds far more complex than is necessary in a funding model that should focus on student learning
- The current standards of the School Facilities Commission will encourage (if not force) the construction of energy efficient facilities in the future

The specific utility costs included in this recommendation are: 1) Natural Gas, 2) Electricity, 3) Fuel oil, 4) Gasoline, 5) Coal, 6) Propane, 7) Water, 8) Sewer, 9) Garbage and 10) Communications.

The Committee approved all the recommendations for Operations and Maintenance at its October 31-November 1, 2005 meeting.

To facilitate understanding of the way each of these recommendations is utilized in the development of the cost based model, Appendix G summarizes the application of these recommendations in the model.

I2. Administration and Miscellaneous Expenditures

Current Wyoming Block Grant. The Wyoming Block Grant Funding Model funds central administration through a series of district-level prototypes. Costs for district-level prototypes were derived using 2001-02 cost levels. Three prototypes were created at ADM levels of 250, 550 and 1,000 students. Costs were derived by estimating the personnel needs of district offices in various size school districts, determining the costs of those personnel and then converting that cost estimate to a per pupil figure.

Staffing levels for the 250 ADM school district includes four administrators (Superintendent, Business Manager, Assistant Superintendent for Instruction, and a Technology manager), as well as two clerical positions. The prototype for 550 students added a fifth central office administrator and a third clerical position, while the 1,000 ADM prototype added a sixth central administrator, along with a fourth clerical position.

These positions are converted to a dollar basis and funds are provided to districts based on their prototype category.

Districts with a three-year ADM of 250 or fewer generate the minimum prototype funding level. Districts with three-year ADM of more than 250 but less than 550 generate the minimum prototype funding level plus $171.47 per ADM between 250 and 550. Districts with three-year ADM of more than 550 but less than 1,000 generate the second prototype funding level plus $183.57 per ADM. Districts with three-year ADM of at least 1,000 but less than 2,355.859 generate the third prototype funding level. Districts with three-year ADM of more than 2,355.859 generate the third prototype funding level plus $214.10 per ADM greater than 2,355.859.

The Wyoming Block Grant Funding Model provides funding for differential cost factors associated with central administration personnel hired by school districts. Salary levels of central administrators differ across school districts based on responsibility levels (enrollment of school district), years of experience, and education levels (both masters and doctorate). The salary levels of central administration personnel, employed by a school district, are adjusted for these cost factors.

The Evidence: The district office has the responsibility to organize and manage all aspects of the district including the curriculum and instructional strategies, as well as to implement national, state, and local reforms, oversee budgets, and provide necessary materials, equipment, facilities, and repairs to the schools. Its ultimate purpose is to facilitate and support the educational program at schools so that teachers are able to teach and students are able to learn. The reform group, School Communities that Work (2002), succinctly states the purposes of the central office: equity and results. The group elaborates that equity—what others may prefer to call adequacy—means to provide varying resources based on individual student's needs so that all will demonstrate achievement results.

The Cross City Campaign for Urban School Reform (Burch & Spillane, 2004), sees a district office's primary responsibility as facilitating and encouraging an exchange of information and expertise among schools and among instructional leaders. Burch and Spillane (2004) view with special significance the mid-level district staff whose job it is to translate "big ideas like 'improving literacy district-wide' or 'closing the achievement gap' into strategies, guidelines, and procedures that are handed down to schools" (p. 1)[18]. In providing this interpretive role, district staff members can hinder or assist the efforts of classroom teachers and

[18] In many Wyoming districts, such mid-level managers do not exist due to the small size of the district. In such districts, this responsibility would fall to the central office administrators the district chooses to hire.

site administrators, and their success and assistance can mean increased achievement for children.

Some question whether or not central offices are necessary to the operation of a school district. Berg and Hall's (1997) study of central offices that had downsized and the effects of that restructured environment over a three-year period provides important evidence to support the relevance of a central office. The districts studied had downsized as a way to reduce costs due to budget constraints and in response to public criticism of bloated bureaucracies. What Berg and Hall found over the three years of the study was that initially districts seemed to take the central office reduced-staff changes in stride and even relished the idea of being more productive and efficient. Later, the euphoria employees felt often turned to burn-out as so much more individual effort and time was required to complete important tasks. Often, tasks that could no longer be completed at the district level were sent to principals, thus leaving them with fewer hours to be instructional leaders. The principals who were interviewed expressed feeling deserted by the central office. Some districts studied had hired back retirees temporarily or part-time as a cost-effective way to meet the demands on staff due to growing student populations or new state mandates regarding standards and assessment. The researchers reasoned that central offices are not irrelevant as some critics have insisted.

Berg and Hall (1997) conclude that central offices are necessary to complete essential tasks, which otherwise will be accomplished by site personnel. One of their main findings is that the workload for these particular site personnel had become so exhausting as to be detrimental to the core purpose of teaching and learning. The researchers also find that without a fully functioning central office, districts tend to recreate one at each site. This not only diverts personnel from the core function of instruction, it also reduces the efficiency they were seeking.

Relying on personal experience and consultant work, DuFour (2003) argues that central district offices are essential to the operation of a school district. She suggests that central offices can be effective role models of a learning community focusing on student improvement if they will limit the number of district goals or initiatives to one or two and will have their staff members all contribute toward that goal or goals. DuFour emphasizes the importance of central offices as service oriented centers whose staff members collaborate and focus on results.

Flynn (1998) claims the central office's primary role is to prepare site personnel to make decisions. He provides details from his own district that was restructured to provide the typical support and guidance roles to principals as well as monitoring and auditing functions. He states that the central office must teach collegiality and cooperative relationship building so that students will benefit from the site-based decision-making model.

The discussion above provides a justification for central office administrators, but provides no guidance as to how many positions are needed for different size districts. Moreover, little research exists to help determine what an appropriate staffing configuration might be. The problem is complicated by the frequent employment of special education administrators and federally funded administrators in district offices – many of whom are funded partially with district funds and partially with Federal and/or special education funds.

We are aware of two efforts to correct this deficiency in the research literature. In our work in Kentucky (Picus, Odden & Fermanich, 2003), we held a professional judgment panel session that attempted to estimate the appropriate staffing pattern for a prototype school district of 3,500 pupils. The discussion bogged down over how to treat administrators for categorical programs, and a satisfactory solution to the question of appropriate numbers of central office

administrators was not reached. Instead, we relied on the average per pupil spending for central administration and applied that average to each district in the state.

Recently, under the direction of Lawrence O. Picus, an Ed.D. student at the USC Rossier School of Education completed a series of focus groups in California that considered the issue of staffing for a school district's central office (Swift, forthcoming). Using a prototype district of 3,500 students, the focus groups suggested the central office staffing pattern depicted in Chart 5. The panelists identified four primary functions of a central office:

- District leadership
- Instructional leadership
- Business Operations
    - Budgeting and finance
    - Maintenance and operations
- Technology

Using the model developed by Swift's focus groups (Swift, forthcoming) the central office of a 3,500 student district would include 6 administrative positions, 3 professional positions, and 11 clerical, technical or support positions. In a Wyoming district with 3,500 students, the special education director and secretary could be removed from this computation because at the present time, special education costs are fully reimbursed by the state.

Chart 5
Composition of a Central District Office for a District with 3,500 Students: Results from Four Professional Focus Groups

Position Title
1 Superintendent (admin) 1 Assistant Superintendent (admin) 1 Executive Assistant (clerical) 1 Personnel Technician (clerical)
1 Director of Curriculum and Instruction (admin) 1 Director of Pupil Services/Special Ed (admin) 1 Nurse (professional) 1 Secretary—Special Ed (clerical) 1 Data Steward (clerical) 1 Clerk (clerical)
1 Business Manager (admin) 1 Payroll Clerk (clerical) 1 Accounts Payable Clerk(clerical)
1 Director of Technology (admin) 1 Media Technician I (tech) 1 Media Technician III (tech)
1 Director of Maintenance/Operations (professional) 1 Maintenance Worker (support) 2 grounds keepers (support) 1 Director of Food Services (professional)

Using this model for a prototype district of 3,500 students in WY would produce the following positions:

- 5 Administrative positions
- 3 Professional positions
- 10 clerical, technical or support positions

Unfortunately, only five of Wyoming's 48 school districts have 3,500 or more students. A more reasonable prototype size district is needed. Using the school prototypes of 288 elementary, 300 middle school and 600 high school students, a prototypical district of two elementary, one middle and one high school would have something on the order of 1,300 students or approximately 100 students per grade.[19]

A simple pro-ration of the resources estimated by the focus groups to a prototype district of 1,300 students leads to the following central office staffing recommendation:[20]

- 2 central office administrators
- 2 professional positions
- 4 clerical positions

Assuming the professional positions are similar (although possibly lower paid) to the intent of administrative positions in the current model, this model would provide fewer staff at the central office than the current model allocates for a district of 1,300 students. The current model provides 6 central office administrators and 4 clerical positions at this level, or 2 more administrative/professional positions.

Recommendation. We initially recommended that this prototype be prorated downward by size to a district of 500 students, which would provide 2 administrative and 2 clerical positions for a district of this size. We then recommended that this be the central office administrative and support staff for all districts smaller than this ADM, and prorated up for districts with a larger ADM. This would have provided the 1,000 ADM district with 4 administrators and 4 clerical positions, and the 2,000 ADM district 6 administrators and 6 clerical positions. Furthermore, these positions would be in addition to all administrative and

[19] This implies a high school of closer to 400 students than 600, but we argue that for the purposes of central administration, the same level of personnel would be required.
[20] Fractional positions have been rounded up to full FTE positions.

clerical positions for special education and transportation, which are completely reimbursed separately by the state.

At the Professional Judgment Panels, nearly all panelists generally agreed with our conclusion that the current system was not calibrated at the correct levels. However, the issue of the need for central office technology and assessment/evaluation support entered nearly all discussions on this issue. One panel recommended that we modify our proposal for the 500 and less ADM districts to 3 administrative and 3 support staff, so that a technology/assessment director could be included. At the 1,000 student level, this panel said the 4 administrative positions could then be a superintendent, a business officer, a technology director and an assessment director.

We concur with this panel's recommendation and alter our recommendation to this proposal to include a technology director for school districts with fewer than 500 ADM. Thus, we recommend the following central office staff:

Districts with ADM less than or equal to 500:	3 administrative and 3 clerical
Districts with ADM of 1,000:	4 administrative and 4 clerical.

Districts with ADM above 1,000 would have a pro rata increase in personnel, and there would be a per pupil adjustment to increase the resources from the 500 to the 1,000 ADM level.

The Committee approved this recommendation at its June 30-July 1 meeting.

Central office miscellaneous expenditures. In the current model, the state provides $135 per ADM for central office, non-staff expenditures, which if inflated by 14 percent (using the WCLI) to a 2004-05 figure, would be about $154. This figure initially was derived by noting that these expenditures were about 37.46 percent of central office expenditures, which on average in the year analyzed were $359. In an analysis of 2003-04 central office expenditures,

which on average totaled $25 million, we found that non-salary expenditures were closer to 44 percent of central office expenditures and today covers more items, such as Board services. Using these figures and dividing by the number of students in the state yielded a figure of $295/ADM for central office miscellaneous expenditures. This number should be somewhat higher when we conduct the analysis with 2004-05 data.

Recommendation: We recommend that $300/pupil be provided for central office miscellaneous expenditures.

The Committee approved this recommendation at its October 31-November 1, 2005 meeting.

I3. Transportation

Current policy. Wyoming currently reimburses districts for 100 percent of transportation costs.

Recommendation. We recommend that Wyoming continue the current policy of reimbursing districts for 100 percent of transportation costs.

J. Security and Safety

At its May 26-27, 2005 meeting in Casper, the Select Committee raised the issue of security and safety needs for Wyoming's schools. Currently, many districts receive services from the local police department, which often deploy "district resource officers" to work in the school system. Increasingly, these expenditures are being transferred to school districts. In addition, many districts provide security staff at specific schools for multiple reasons. Third, the Facilities Commission believes it will soon be receiving requests to embed security systems into school buildings, the result in part of issues related to Homeland Security.

For these reasons, there may be a need to add resources for safety and security for schools and districts. According to 2003-04 expenditure data provided by the Wyoming Department of Education, districts reported general fund spending of $676,593 on safety and security (Function 3460). However, only 12 districts reported any spending in this area. The majority of this spending was for contracted services and staff salaries. A more complete analysis of any increase in the need for safety and security revenues may not be possible until expenditure data are available for 2004-05. In the short term, the state could create a grant program to provide some security and safety assistance in the very short term. Since analysis of this issue is beyond what can be accomplished during the recalibration effort, we would propose that the state create a more comprehensive project to research safety and security issues in schools, with the goal of proposing how the state should include such needs in its school funding system.

RECOMMENDED RECALIBRATED RESOURCES FOR PROTOTYPICAL SCHOOLS

Our initial draft recommendations for resources in Wyoming's prototypical elementary, middle and high schools are included in Table 1. Table 2 summarizes the school level personnel resources generated by prototypical schools as well as the resources generated by pro-rating the size of the prototypical schools at various levels.

Table 1

Recommended Recalibrated Resources for Wyoming's Prototypical Elementary, Middle and High Schools

Resource Element	Elementary Schools	Middle Schools	High Schools
School Characteristics			
School configuration	K-5	6-8	9-12
Prototypic school size	288	315	630
Class size	K-5: 16	6-8: 21	9-12: 21
Full-day kindergarten	Yes	NA	NA
Number of teacher work days	188 teacher work days, so an increase of 5 days.	188 teacher work days, so an increase of 5 days.	188 teacher work days, so an increase of 5 days.
Percent Disabled (st. avg.)	13 %	13 %	13 %
Percent Poverty (st. avg. free & reduced lunch)	30 %	28 %	22 %
Percent ELL (st. avg.)	5 %	5 %	5 %
Percent Unduplicated At-Risk Pupil Count (estimated)	40 %	40 %	40 %
A. Personnel Resources			
A1a. Core Teachers	18.0	15	30
A1b. Specialist teachers	20% more: 3.6	20% more: 3.0	20% more: 6
A1c. Instructional Facilitators/ Mentors/Coaches	1.5	1.5	3.0
A2a. Teacher tutors for at-risk students	1 FTE teacher tutor for every 100 "at-risk" students: 1.2	1 FTE teacher tutor for every 100 "at-risk" students: 1.2	1 FTE teacher tutor for every 100 "at-risk" students: 2.4
A2b. Additional Teachers over those for at-risk for ELL students	An additional 1.0 FTE teacher for every 100 ELL students 0.15	An additional 1.0 FTE teacher for every 100 ELL students 0.16	An additional 1.0 FTE teacher for every 100 ELL students 0.32

Table 1 (Continued)
Recommended Recalibrated Resources for Wyoming's
Prototypical Elementary, Middle and High Schools

Resource Element	Elementary Schools	Middle Schools	High Schools
A. Personnel, continued			
A2c. Extended day program	0.25 teacher positions for every 15 extended day students: 4.0 extended day teachers paid 25% of salary extra, so 1.0 FTE	0.25 teacher positions for every 15 extended day students: 4.0 extended day teachers paid 25% of salary extra, so 1.0 FTE	0.25 FTE position for every 15 extended day students: 8.0 extended day teachers paid 25% of salary extra, so 2.0 FTE
A2d. Summer school	0.25 teacher positions for every 15 summer students: 4.0 summer teachers paid 25% of salary extra, or 1.0 FTE	0.25 teacher positions for every 15 summer students: 4.0 summer teachers paid 25% of salary extra, or 1.0 FTE	0.25 FTE position for every 15 summer students: 8 summer teachers paid 25% of salary extra, or 2.0 FTE
A2e. Alternative School	NA	NA	1 AP position plus 1 Teacher position for every 7 students
A3. Substitutes	Additional 5% of ADM generated teacher at $85/day plus 7.65 %	Additional 5% of ADM generated teacher at $85/day plus 7.65 %	Additional 5% of ADM generated teacher at $85/day plus 7.65 %
A4. Aides	2.0	2.0	5.0
A5. Pupil support staff	1.0 FTE position for every 100 at-risk students: 1.2	1 for every 100 at-risk students plus 1.0 guidance counselor for every 250 students 2.5 total	1 for every 100 at-risk students plus1.0 guidance counselor for every 250 students 5.0 total
A6. Librarians/media technicians	1.0 Librarian	1.0 librarian plus 1.0 librarian technician	1.0 librarian plus 2.0 librarian technician
A7. School Administration	1	1	2
A8. Secretary/Clerical	1.0 Senior secretary 1.0 Clerical/data	1.0 Senior secretary 1.0 Clerical/data	1.0 Senior secretary 4.0 Clerical/data

Table 1 (Continued)
Recommended Recalibrated Resources for Wyoming's
Prototypical Elementary, Middle and High Schools

Resource Element	Elementary Schools	Middle Schools	High Schools
Dollar per Pupil Resources			
B. Supplies and Instructional Materials	$285.57/ADM	$285.57/ADM	$349.66/ADM
C. Equipment and Technology	$250/ADM for technology and equipment	$250/ADM for technology and equipment	$250/ADM for technology and equipment
D. Food Services	Self supporting	Self supporting	Self supporting
E. Categorical Aids			
E1. Disabled students	100% state reimbursement.	100% state reimbursement.	100% state reimbursement.
E2. Gifted student resources	Appropriate services required; additional $25/ADM	Appropriate services required; additional $25/ADM	Appropriate services required; additional $25/ADM
E3. Vocational Education	Current system for high school only: extra weight of 0.29 for all FTE vocational education students plus $6782/vocational education teacher in school		
F. Student Activities	$250 per ADM to the district	$250 per ADM to the district	$250 per ADM to the district
G. Professional development	Included above: Instructional facilitators Planning & prep time Additional: 5 summer days $100/ADM for other PD expenses – trainers, conferences, travel, etc.	Included above: Instructional facilitators Planning & prep time Additional: 5 summer days $100/ADM for other PD expenses – trainers, conferences, travel, etc.	Included above: Instructional facilitators Planning & prep time Additional: 5 summer days $100/ADM for other PD expenses – trainers, conferences, travel, etc.
H. Assessment	$28.50/ADM	$28.50/ADM	$28.50/ADM
I1a. Custodial Services	2.0	2.0	4.0
I1b. Maintenance	Not a School Level Function, See pp. 123-126		
I1c. Groundskeepers	Not a School Level Function, See pp. 126-133		
I1d. Supplies			
I1e. Utilities			
I2. Central Office Staff	Not a School Level Function, See pp. 135-142		
I2. Central Misc. Exp	$300/pupil	$300/pupil	$300/pupil
I3. Transportation	100 % state reimbursement	100 % state reimbursement	100 % state reimbursement

Table 2
Summary of Personnel By Prototype

Personnel Resource Category	Elementary			Middle			High School			
School Enrollment	**96**	**192**	**288**	**105**	**210**	**315**	**105**	**210**	**315**	**630**
Core Teachers	6.0	12.0	18.0	5. 0	10.0	15.0	5.0	10.0	15.0	30.0
Specialist Teachers	2.4	4.8	7.2	2.0	4.0	6.0	2.0	4.0	6.0	12.0
Instructional Facilitators	0.5	1.0	1.5	0.5	1.0	1.5	0.5	1.0	1.5	3.0
Teacher Tutors (state avg.)	0.4	0.8	1.2	0.5	0.8	1.3	0.5	0.8	1.3	2.6
ELL Teachers	0.05	0.10	0.15	0.05	0.10	0.16	0.05	0.10	0.16	0.32
Extended Day Program	0.33	0.67	1.0	0.33	0.67	1.0	0.33	0.67	1.0	2.0
Summer School	0.33	0.67	1.0	0.33	0.67	1.0	0.33	0.67	1.0	2.0
Substitutes	5 % of ADM generated teacher positions at $85/day plus 7.65%									
Aides	0.67	1.33	2.0	0.67	1.33	2.0	0.8	1.67	2.5	5.0
Pupil Support	0.4	0.8	1.2	0.8	1.67	2.5	0.8	1.67	2.5	5.0
Librarian	0.5	0.75	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
media technician	0.0	0	0	0.33	0.67	1.0	0.33	0.67	1.0	2.0
School Administration	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0
Secretary/	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Clerical	0	0.5	1.0	0.33	0.67	1.0	0.67	1.33	2.0	4.0
Special Education	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Custodial	1.0	1.5	2.0	1.0	1.5	2.0	1.0	1.5	2.0	4.0

RECOMMENDATIONS FOR SMALL SCHOOLS

At the August 1, 2005 Professional Judgment Panel on Small Schools, there was extensive discussion about how to provide resources for small schools, and for the proposed new K-12, K-8 and 6/7-12 prototypes.

For elementary schools, the following was discussed:

1. For ADM from 1 to 48, provide staffing at the rate of 1 FTE teacher position plus an additional 1.0 FTE position for every 7 students, with a minimum of 2 FTE, until this formula produces the same dollar amount as provided for all staff, including aides and secretaries, for the elementary school with less than 96 ADM.

   This formula would provide 2 FTE teacher positions for a 1 to 7 student elementary school, 3 FTE positions for the 14 student school, 4 FTE positions for the 21 student school, etc., and prorated FTE for student counts in between these figures. These resources could be allocated across a variety of ways of staffing these schools, including teachers, aides, traveling specialists and principals, and combined positions for secretarial, custodial and other classified responsibilities.

2. Use the standard resource formulas for elementary schools from 48 to 96 students, pro-rating the principal position from 1.0 for the 96 ADM school to 0.5 for the 48 ADM elementary school.[21]

   However, several panelists proposed that such schools should have a minimum of 6 core plus specialist teachers so that it could provide one teacher for every grade.

[21] In the prototypes described above, elementary schools with between 96 and 288 students all receive an FTE principal. Between 96 and 48 students, schools receive a proportional share down to a 0.5 FTE principal at 48 students. For example a school with 95 students would receive 95/96 funding for a principal and a school with 48 students would receive 48/96 or ½ of a principal.

Though the consultants recommended using the above teacher resource formulas for elementary schools from 48 to 96 students, the Committee at its August 23rd meeting voted to provide the minimum of 6 teachers.

For secondary schools, the following was generally agreed to:

1. Upon reviewing the middle and high school staffing formulas, the numbers were nearly identical, differing by only 0.5 FTE in the pupil support area. The conclusion was for the state to consider having only one set of staffing formulas for secondary schools and that would be the proposed resources for high schools described earlier in the report. *This recommendation was approved by the Select Committee at its August 23rd meeting.*
2. Use the teacher resources – core and specialist -- for the 105 high/middle school as a base. The consultants recommended figures are 5 core teachers and 2 specialist teachers.
3. For high schools with fewer than 105 students, use the Alternative School formula of 1 AP position plus 1 teacher FTE position for every 7 ADM students, until the dollar total for this resourcing equals the dollar amount of the 105 student high school of 1 principal, 7 teacher FTE positions and the pupil support staff as generated by the formulas in the model.

   This strategy worked quite well because nearly all high schools with an ADM below 105 students were alternative schools, with the "at-risk" designation. However, there are a few "regular" high schools with ADM below 105, so it was recommended that they be resourced through the formulas in the model as if they are a 105 student high school., receiving funding for 1 principal, 5 core teachers, 2 specialist teachers, and the remaining resources allocated to a school of that size. This would require the state to monitor the Alternative and regular high school designation, or all Alternative schools could change

their designation to regular and receive more resources. We believe doing so would subject those schools to the same credentialing requirements currently established for regular schools, but relaxed somewhat for alternative school organizations.

This recommendation was approved by the Select Committee at its August 23rd meeting, with the modification that the minimum number of core plus specialist teachers in small high school would be 9, rather than 7. This occurs at an ADM of 158.

For the K-12, K-8 and 6/7-12 prototypes, the recommendation that emerged from our discussion with the small school representatives was to:

1. Resource these schools with any of the above formulas that are appropriate for the size and the grade level or levels served, e.g. providing elementary resources for the K-5 students, and the secondary, high school resources for the 6-12 students.
2. This approach eliminated the need for separate resource formulas for these schools.
3. Further, provide the administrative, aides, secretarial and librarian resources using the high school formula, but use the school's total ADM for this allocation.

All of these recommendations were agreed to, assuming adequacy of the teacher resources for the 105 student high school. However, several of the panelists argued that a secondary school of that size or smaller would need nine FTE teacher positions, rather than the seven currently recommended. They argued this was necessary to have credentialed teachers qualified to teach all of the courses required to meet the basket of educational services. Our analysis suggests this objective can be done with seven positions, plus use of WEN video, distance learning, other Internet-based program offerings, or post-secondary enrollment, as available to the district. A number of participants at the August 1 meeting strongly advocated for a minimum of nine teacher positions.

This could be accomplished by establishing the minimum prototype size for a secondary school at one-half of 315 or 158 students, using a formula of 1 core teacher for every 21 students plus 20 percent more for specialist teachers.

We, however, are confident that the 105 student minimum with seven teachers (five core and two specialists) is adequate to meet the requirements of the educational basket in Wyoming. At present, the model assumes a minimum of 9 teachers at small high schools as recommended by the Select Committee at its August 23rd meeting

An additional small school issue was the K-8 schools. K-8 schools with enrollments above 48 would be resourced using the elementary formula for the K-5 students, and the secondary formulas for the grade 6-8 students. However, most K-8 schools are very small. One proposal was to use the small elementary school formula to resource K-8 schools with 21 or fewer total students, providing 1 assistant principal position, plus 1 FTE teacher position for every seven students, with a minimum of two positions.

Final Small School and Atypical School Configuration Recommendations

Upon further analysis, it was clear that there were numerous school configurations, and many elementary, middle and high schools, often co-located, that were very, very small. Thus, the following was adopted for resourcing small schools and schools with atypical configurations:

a. Any school, whether elementary, middle or high school, or whether K-5, K-6, K-7, K-8, K-12, or 9-12, or 8-12, etc. with 49 or fewer students would be resourced using the formula of 1 FTE assistant principal position plus 1 FTE teacher position for every 7 ADM. This formula provides all staff resources for the school, though the model also provides the additional teacher FTEs for vocational education for secondary schools.

b. Schools with an ADM greater than 49 and configured at K-5 and K-6 are resourced as elementary schools. Schools configured as K-7 or K-8 are resourced with the elementary formulas for grades K-5, and with the middle school formulas for grades 6-8, with the minimum 7 core and specialist teachers.

c. Schools with an ADM greater than 49 and configured as a 5-12, 6-12, 7-12, 8-12 or 9-12 school would be resourced as a secondary school for core, specialist teachers and pupil support resources, but all other resources – principal, assistant principal, supplies, books, secretarial, etc. – would be resourced by grade according to the middle or high school formulas.

These decision rules simplified the modeling enormously, and provided virtually the same resources as trying to resource each grade as an elementary, middle or high school grade.

The Committee approved these recommendations at its October 31-November 1, 2005 meeting.

SALARIES AND BENEFITS

Lawrence O. Picus and Associates contracted with Dr. Michael Wolkoff, University of Rochester, and Dr. Michael Podgursky, University of Missouri-Columbia, to conduct analyses of salaries and benefits levels, as well as experience, responsibility, and education adjustments, when appropriate. Their report is included in Appendix F, Estimation of Salary Levels for the Wyoming School Finance Model. They benchmarked teacher salary increases in Wyoming to other benchmarks and found that Wyoming surpassed all other benchmarks since the last recalibration. The also analyzed teacher mobility, recruitment and retention and found no significant patterns of teacher loss. As a result, these labor market economists concluded that teacher salaries in Wyoming were adequate. Using actual salary data from the 2004-05 school year, they provided salary figures for:

- Teachers, including all individuals on lines A1a, A1b, A1c (core teachers, specialist teachers and instructional facilitators), A2a, A2b, A2c, A2d, A2e (tutors, ELL, extended day and summer school, alternative schools), A5 (pupil support) and A6 (librarians), except the assistant principal position for the alternative schools.
- Principal and assistant principals, line A7
- Secretarial/clerical staff, lines A8 and I2. Fortunately, the data did allow us to identify a separate figure for central office secretary, site secretary and clerical.
- Central office administrators including separate figures for superintendents, assistant superintendents, and business managers, line I2.
- Operations and maintenance staff, including custodians, maintenance workers and groundskeepers, lines I1a, I1b and I1c.
- Aides, line 4, and media technicians, line 6.

We asked these researchers to construct experience adjustments for all staff categories, in addition to construct education adjustments for teachers, and finally to construct education and size of district (ADM) adjustments for administrators, similar to the approaches taken in the current model. Their strategy was to use multiple regressions with salary as a function of years of experience, education (when appropriate) and ADM (when appropriate). The intercepts of the regression lines were the average beginning salaries. The coefficients were the experience, education and/or ADM incremental values.

Teachers

For teachers, we calculated the statewide average teacher salary from the average beginning salary and the following factors: the average total number of years of experience up to 20 years and the experience increment for those years, the average number of years of experience beyond twenty and the experience for those years, and the percent of teachers with a Masters degree or more and the education increment for that education attainment. The results were:

Average teacher salary: $40,982

Average teacher salary with 5 extra days: $42,007

Factors:

Factors	State Average	Value per Unit
Years of state experience below 20	12.35	$ 728
Years of state experience above 20	2.24	$ 159
Percent with MA or higher	36.2 %	$ 5,302

From these data, the teacher weighted average teacher salary became $40,982. In addition, each teacher will receive $205 for each of 5 days for the additional professional development. The $205 figure is the above average, $40,982 divided by 200 days, the current number of days covered by the typical school year: 181 day contract plus 10 days of winter and 5

days of summer break and 4 miscellaneous other holidays. This brings the statewide average teacher salary to $42,007. Assuming no changes by other states, this figure increased Wyoming's ranking in average teacher salaries in 2004-2005 from approximately 38 to 32.

Principals

We also constructed wage figures for principals and assistant principals. The major factors producing variation were years of state experience, having a doctorate degree, and size of school as represented by ADM. The following are the final figures:

Average principal salary: $66,110

Average assistant principal salary: $55,442

Factors:

Factors	State Average	Value per Unit
Years of state experience	6.2	$ 424
Have a doctorate	4.0 %	$ 5,158
Average school ADM	231	$ 10.60

In calculating average principal and assistant principal salaries for each district, we used the average school ADM in that district as the ADM multiplier.

Secretaries

We were able to construct different wage figures for secretarial help at both the school site and central office levels. The data showed that central office secretarial staff worked both more hours and were paid at a higher level. Thus we created three levels of secretarial staff:

Central office secretary working 2080 hours per year: $ 28,975

School building secretary working 2080 hours per year (senior secretary): $ 26,040

Factor for the above: Value of year of experience: $ 393

Average years of experience: 9.5

Clerical working 1600 hours per year: $ 19,656

Factor: Value of year of experience: $ 302

Average years of experience: 9.5

Superintendents, Assistant Superintendents, Business Officers

The recommendations for central office staff include three categories of individuals: superintendents, assistant superintendents and business managers. The model developed has bachelors, masters and doctorate degree adjustments, an experience adjustment, and a district size (ADM) adjustment. The size variable is intended to approximate the "magnitude" of the administrative responsibility.

The results are as follows:

Average superintendent salary: $ 90,200

Average assistant superintendent salary: $ 72,160

Average business manager salary: $ 58,302

Factors:

Factors	State Average	Value per Unit
Years of state experience	7.3	$ 300
Have a bachelors degree	34.6 %	$ 11,450
Have a masters degree	42.3 %	$ 14,812
Have a doctorate	10.3 %	$ 15,306
Average district ADM	1,768	$ 4.64

Few school districts actually had assistant superintendents. So, to determine an appropriate assistant superintendent salary for each district, the model first calculates the superintendent salary with the above data, and then uses the average ratio of assistant superintendent salaries to superintendent salaries for all districts that actually had assistant

superintendents to determine the assistant superintendent salary for the model. That ratio was 0.80.

Maintenance and Operations Staff

The analysts were able to construct two sets of salary variables, one for school-site staff and one for central-office staff. Because the funding models could not distinguish between all site and central office staff for these positions, we have applied the site salary figures to custodians, and the central office figures to maintenance and groundskeepers staff:

Central office maintenance and groundskeepers state average salary:		$ 30,489
Site custodians state average salary:		$ 24,521
Factor:	Value of years of state experience for all levels:	$ 404
	Average years of state experience:	10.3

Aides and Media Technicians

The results for aides and media technicians are as follows. The figures are for an aide working 1480 hours a year, which is 185 days times 8 hours a day, and for a median technician working 2040 hours per year:

Average aide salary: $ 14,828

Factors:

Factors	State Average	Value per Unit
Years of state experience	4.8	$ 252
Have a bachelors degree	7.0 %	$ 1,465

Average media technician salary: $37,754

Factors:

Factors	State Average	Value per Unit
Years of state experience	4.5	$ 645
Have a bachelors degree	13.3 %	$ 14,035

The Committee approved the salary level recommendations at its October 31-November 1, 2005 meeting.

Using the Salary Figures in the Costing Model

From the results, we used the average salary figures reported above for all staff categories. We then calculated a district average salary by adjusting the statewide figure up or down depending on the average years of experience, education degrees or appropriate ADM figure for the district, relative to the statewide average. So for example, if the average year of experience for a particular staffing category was 2 years above (or below) the state average, that average salary was increased (decreased) by 2 times the experience increment for that staff category. The result was an adjusted average salary for each staff position for each district. Finally, in the costing model, this district average salary for teachers, including instructional facilitators, counselors, librarians and any staff paid on a teacher salary schedule, principals, assistant principals, superintendents, assistant superintendents, business managers and library media technicians, i.e., those professionals in a statewide labor market, was then multiplied by the Hedonic Wage Index for that district to produce a cost-based regionally adjusted average salary (see next section on regional or geographic cost adjustments). The Hedonic Index was not applied to salaries for secretaries, clerical, supervisory aides or maintenance and operations staff.

In costing out the model, moreover, we calculated the average education (where appropriate) and experience figures for each staff category for each district on the basis of the actual numbers of staff in the various categories. But we recommended that the state fund only the teacher and administrator numbers generated by the recalibrated model, on the assumption that the model generates a cost-based, adequate level of staffing, and that the model-generated

level of staffing should be used to determine the costs of the model and the level of dollars the state provides to districts.

At the August 23rd meeting, the Committee approved providing the education and experience adjustments just for the number of staff produced by the model.

Recommendation on Benefits

We recommend that the benefit rate be:

- State retirement: 11.25 percent[22]
- Social security and Medicare: 7.65 percent
- Workers' compensation: 0.70 percent
- Unemployment compensation: 0.06 percent

These figures total to 19.66 percent. Long term disability costs can be added when we know what that figure will be.

The Committee approved this benefit rate at its August 23rd meeting.

To this percentage for benefits, we recommend a dollar amount for each employee for health coverage. Last year, the LSO estimated an amount of $7,235 as the weighted health care cost the state will provide in 2005-06 for state workers for health coverage. If the state decides to support health benefits for educators at the same or similar rates as it does for other state workers, than this amount is an estimate of the dollar figure that might be required. A report on the cost of health benefits prepared by Buck Associates, LLC in November 2005 provided additional data on the costs of health care benefits for public employees in Wyoming. Using a composite estimate of the number of school district employees who would elected to receive

[22] 5.68 percent district and 5.57 percent individual contributions

health coverage equal to what the state provides for state employees, LSO staff estimated that the cost of health benefits under the state system for 2006-07 would amount to $8,231 per employee.

Recommendation on health benefits: We recommend that the state provide a dollar per employee amount that would approximate what the state spends on health benefits for other state workers. That amount is approximately $8,231 for 2006-07. We also recommend that the state allow each school district to opt into the state health plan.

The Committee approved this health benefit rate and the opt-in proposal at its August 23rd meeting.

We should note that Wyoming ranks among the top states in the country in per pupil spending on employee benefits. Indeed, the state provides for full social security, a generous state retirement system, and with the above changes, a full health plan. According to the U.S. Census of Governments, Wyoming ranked 12th in the country in per pupil spending on benefits in 2003 ($1,860 per pupil), compared to a national average of $1,438, and above the spending on benefits in all surrounding states: $924 in Colorado, $1,026 in South Dakota, $1,092 in Utah, $1,173 in Idaho, $1,247 in Montana, and $1,375 in Nebraska.

MAKING COST ADJUSTMENTS IN WYOMING

Wyoming's school finance system is comprised of different components (i.e., prototypical models) and resources within those components (e.g., teachers, administrators, non-personnel items) to deliver "the basket" of educational services specified by the Wyoming legislature. The funding provided to school districts by the state to deliver the basket is tied directly to those components and resources. Funding to school districts of these components and resources, as directed by the Wyoming Supreme Court, must reflect their costs.

The prices of model resources vary over time and vary across districts. Therefore, two types of price adjustments should be considered when developing and implementing the model – an external cost adjustment to reflect changes in prices over time and a regional cost adjustment to reflect varying costs of resources across regions in the state. To date, Wyoming has used both an external cost adjustment and a regional cost adjustment as part of its school funding model. This section reviews the methods used and offers recommendations for the future.

The discussion below summarizes current practice and our recommendations for the recalibrated Wyoming school finance system. However, the issue of cost adjustments in education is widely debated. To provide further clarification regarding our recommendations, we have included a direct quotation from work on regional cost adjustments written by leading economists William Duncombe and Dan Goldhaber on cost adjustments in Maryland; their work follows the long term work of economist Jay Chambers (1981, 1995) on appropriate regional cost-based adjustments in education. The Duncombe and Goldhaber work, contained in Appendix D, provides further information about the importance of geographic cost adjustments and how to think about them in a cost-based context.

External Cost Adjustment (ECA)

The Wyoming school funding model is systematically recalibrated at least every five years, as directed by the Wyoming Supreme Court. The funding model was recalibrated to reflect costs in 2001-02. The funding model will be recalibrated to reflect 2006-07 costs as a result of this study. The costs of resources cannot be assumed to stay constant in the interim years between full recalibration. However, the costs associated with full-model recalibration prohibit the model from being fully recalibrated on an annual basis to reflect changing costs.

Given the prohibitive costs associated with conducting an annual full-model recalibration, an external cost adjustment should be used to reflect the changing costs of resources in the interim years between full-model recalibrations. The Wyoming legislature has considered a number of alternatives when choosing an annual ECA to apply to resource costs. These include:

- The Consumer Price Index (CPI-U) for All Urban Customers;
- The Wyoming Cost of Living Index (WCLI); and
- A hybrid of different price indices including the Employment Cost Index (ECI), the Western states CPI-U, and the Midwest CPI-U of City Size D.

The commonality of all of these indices is that they measure the change in prices over a period of time.

Consumer Price Index**.** The U.S. Department of Labor's Bureau of Labor Statistics (BLS) calculates the Consumer Price Index (CPI). The BLS defines the CPI as a measure of the average change over time in the prices paid by urban consumers for a market basket of consumer goods and services. The CPI-U reflects the price changes for all urban consumers. The expenditures for goods and services as measured by the CPI fall into more than 200 categories and are arranged into eight major groups:

- FOOD AND BEVERAGES (breakfast cereal, milk, coffee, chicken, wine, service meals and snacks);
- HOUSING (rent of primary residence, owner's equivalent rent, fuel oil, bedroom furniture);
- APPAREL (men's shirts and sweaters, women's dresses, jewelry)
- TRANSPORTATION (new vehicles, airline fares, gasoline, motor vehicle insurance);
- MEDICAL CARE (prescription drugs and medical supplies, physicians' services, eyeglasses and eye care, hospital services);
- RECREATION (televisions, pets and pet products, sports equipment, admissions);
- EDUCATION AND COMMUNICATION (college tuition, postage, telephone services, computer software and accessories);
- OTHER GOODS AND SERVICES (tobacco and smoking products, haircuts and other personal services, funeral expenses).

Through a variety of statistical procedures for item sampling, weightings, and calculations, an index number reflecting the average change in the prices of these goods and services over time is computed. The inflation rate, as measured by the CPI-U, from December 2003 to December 2004 was 3.3 percent.

An alternative measure of inflation utilizing CPI data presented to the Wyoming legislature for consideration is the percentage change between average monthly inflation rates between two years. That is, BLS publishes monthly CPI-U figures, and rather than using the change in prices between two points (from one year to the next), an average of the monthly inflation rates over the course of a year is calculated and the percentage change between the two average-annual CPIs is measured. According to Gerking (1999), this annualized method is

preferable to minimize potential seasonal impacts that might affect measures of price changes between two points in time.[23]

Wyoming Cost of Living Index**.** The Economic Analysis Division of the State of Wyoming's Department of Administration and Information collects and publishes a price index – the Wyoming Cost of Living Index (WCLI) – to estimate inflation rates specific to the state of Wyoming and five regions of the state. Similar to the CPI, pricing data on 140 consumer goods and services are collected and aggregated into six major groups. These groups and their relative weightings in the calculation of the WCLI are:

- HOUSING (47.7 percent);
- TRANSPORTATION (16.9 percent);
- FOOD (14.4 percent);
- RECREATION & PERSONAL CARE (9.7 percent);
- MEDICAL (6.1 percent); and
- APPAREL (5.2 percent).

As measured by the WCLI for all items, the inflation rate for the entire state of Wyoming for the fourth quarter of 2003 through the fourth quarter of 2004 was 4.3 percent. As part of the full-model recalibration in 2001-02, the cumulative, four-year WCLI (1997-2001) was applied to nonpersonnel-cost items within the funding model to bring them to reflect the change in costs from the time of the model's design and implementation in 1997 to its recalibration in 2001.

Employment Cost Index and Consumer Price Index Hybrid**.** The BLS also calculates the Employment Cost Index (ECI) that measures the changes in compensation costs which include wages, salaries, and employer costs for employee benefits for civilian workers (nonfarm private

[23] Gerking, S., "Analysis of External Cost Adjustment Factors for Wyoming K-12 Public Education Finance," University of Wyoming, August 1999.

and State and local government). Given the largest budget category in any school funding model is personnel, using the ECI (or some of its disaggregated components) would seem appropriate.

Given the labor-intensive nature of schooling, a hybrid inflation factor is calculated using a combination of inflation measures. Included in this calculated inflation factor are the:

- ECI-All Workers;
- ECI-Executive, Administrative, and Managerial;
- ECI-Professional (Specialty & Technical Occupations);
- CPI-U: West; and
- CPI-U: Midwest, City Size D.

The above ECIs are for private-sector workers only. Utilizing the CPI-U: West measures the change in prices specific to states in the western region as opposed to the national average change in prices over a specific time period. The CPI-U: West region includes Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. The CPI-U: Midwest region includes Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. However, instead of using the price change for the entire Midwest region, the average price change for cities with D classification (all nonmetropolitan urban areas) in the region is used.[24]

A series of weights are assigned to each of the above indices to construct a hybrid inflationary index that accounts for the change in prices in employment of labor and the change in prices of goods and services in the general region (Rothstein, 1998).

[24] There are three population size-classes used by the BLS: A – represents all metropolitan areas over 1.5 million persons; B/C – represents mid-sized and small metropolitan areas (fewer than 1.5 million persons); and D – represents all nonmetropolitan urban areas. There are no West region size-class D indexes due to insufficient sample sizes.

As Gerking (1999) articulated, there are relative strengths and weaknesses to each of the above inflationary measures. There are any number of and combinations of indices that could measure the level of price changes over time that could used in the Wyoming school funding model. The weakness of any of the existing and currently utilized price indices is that they are not directly tied directly to the specific costs identified in the Wyoming school funding model.

There is no single "best" approach that we are aware of for estimating the impact of inflationary factors on the costs of schooling. However, it is our view that a fixed methodology for computing the external cost adjustment should be developed and utilized. The benefit of doing so is that it makes the cost (and hence local district revenue) resulting from the external cost adjustment transparent and predictable each year, facilitating school district budgeting decisions. The Wyoming Legislature should select one of the three methods outlined above and implement it each year until the next recalibration.

External cost adjustment recommendation**.** We recommend that the state use the Wyoming Cost of Living Index to adjust annually all dollar parameters and salary levels in the formula between the major recalibrations.

The Select Committee approved this recommendation at its August 23rd and October 31-November 1, 2005 meetings.

In running the cost model for those situations in which we needed to adjust the 2002 calibrated dollar figures to an appropriate 2004-2005 base, for use in simulating 2005-2006 aids, we used a cumulative WCLI cost adjustment of 14 percent.

Regional Cost Adjustment

The *Campbell I* ruling that the Wyoming school finance system be cost-based also specified that the finance system must account for regional cost differences. The initial regional

cost adjustment (RCA) used by the state was a modified version of the Wyoming Cost of Living Index (WCLI). As described by the Wyoming Economic Analysis Division, the WCLI was designed to reflect relative price differences across the state for goods consumers buy. The initial Regional Cost Adjustment developed for the distribution of funds to schools excluded the housing-rental component and the medical-cost component of the WCLI. This was done because the housing-rental component of the WCLI did not reflect the amenity values of location, but did not satisfy the Supreme Court's requirements that the model by cost based. The medical-cost component was excluded because the resources identified in the model already captured the costs associated with medical care.

However, in the *Campbell II* ruling, the Wyoming Supreme Court determined that the entire WCLI or another reasonable formula could be used. Since the *Campbell II* ruling, the full WCLI has been used to make regional cost adjustments in the Wyoming school funding model.

The Wyoming Cost of Living Index. The State of Wyoming's Economic Analysis Division (EAD) calculates two Wyoming Cost of Living Indices – a comparative index to measure the relative price differences between regions of Wyoming, and an inflation index. The same 140 items in the six major categories are used when constructing both indices. All 23 counties of the state are represented in the comparative WCLI with data coming from 28 cities across the state. The WCLI value for each city is relative to the state average value of 100. The general weakness of this approach is that in most counties, only a single city is surveyed on its prices. When an item being surveyed does not exist in a city, a regional average is used in its place. To the extent that EAD is thorough and collects as much data as is possible, it is not unreasonable to argue that the pricing conditions of an entire county could be summarized by one city in any given county. These are typically the largest cities/towns in the county thus

ignoring the price conditions of consumer goods and services in the most remote areas of the state.

Another weakness of this approach is that the data collected in the cities are applied to all of the school districts in the county for which the index is computed. This may not always be a fair representation of the costs of the basket of goods and services used to construct the index in every school district in a county. Given the distances and terrain in Wyoming, it is possible that individuals in one school district in a county may choose to travel to a city in another county for many of their purchases, making the index for that city/county more appropriate to that district. In fact development of a weighted WCLI based on the distance from the city where a school district is located to as many as four of the WCLI survey sites might provide a more accurate picture of the relative costs in each school district.

Another weakness is that the basket of goods consumers purchase is not the same as the basket of goods school districts purchase; to be more cost-based, a regional cost adjustment should indicate the different prices school districts must pay for a basket of educational goods of the same degree and quality.

Alternative Regional Cost Adjustments**.** Unlike the Consumer Price Index (CPI) calculated by the Bureau of Labor Statistics (BLS), the comparative WCLI attempts to make price comparisons among regions. The CPI, according to the BLS, cannot be used to measure differences in price levels or living costs between one place and another; it measures only time-to-time changes in each place. However, the comparative WCLI, despite its name, is not a true cost-of-living index. It remains, by design, a relative price index.

The BLS, in its frequently asked questions (#4), explains why the CPI – or any price index, for that matter, including the comparative WCLI – is different than a cost-of-living index.

> A cost-of-living index would measure changes over time [or across regions] in the amount that consumers need to spend to reach a certain *utility level* or *standard of living*. Both the CPI and a cost-of-;living index would reflect changes in the prices of goods and services, such as food and clothing that are directly purchased in the marketplace; but a complete cost-of-living index would go beyond this to also take into account changes in other governmental and environmental factors that affect consumers' well-being.

Other governmental and environmental factors that might affect consumers' well-being include water quality, quality of schools and public safety, access to quality health care, and access to recreational activities or other amenities. These relative cost differences are not captured in a price index such as the comparative WCLI. That is, though the prices of goods and services may be equal in two locations, the cost-of-living for persons in those two areas are not necessarily the same given the environmental conditions affecting the well-being of persons in those two areas. To properly capture these cost differences, an alternative framework should be pursued.

Chambers (1981) first proposed the use of a hedonic-wage model to create a cost-based way to adjust for regional price differences for an education basket of services, what is known as a cost-of-education index (CEI). The CEI and related Teacher Cost Index (TCI) (Chambers 1995) attempt to answer the following question.

> *How much more or less does it cost in different jurisdictions to recruit and employ school personnel with similar characteristics into similar jobs and job assignments? (Chambers 1995)*

At the core of the hedonic-wage methodology is the intuitive notion that individuals care about the quality of their work environment, the monetary and nonmonetary rewards associated with their jobs, and the conditions associated with where their job is located. "The word hedonic literally refers to the physical and psychic pleasures that one can derive from engaging in certain activities (Chambers 1981)." The hedonic-wage methodology would more completely capture

the physical and psychic pleasures, in this case, costs, from being employed in a given Wyoming school and school district.

The basic hedonic-wage model used to construct the national geographic cost-of-education index (GCEI) and TCI, building upon teacher compensation and other cost-of-education cost analyses, includes variables that reflect the costs of living (such as the WCLI) as well as other amenities and disamenities of the jurisdictions and regions in which public school systems are located. This methodology is well regarded in the education community and recognized by the National Center for Education Statistics (NCES) at the U.S. Department of Education as a viable methodology for recognizing geographic cost differences (Fowler & Monk, 2001). The GCEI is available for more than 14,000 school districts in the nation for 1987-88, 1990-91, and 1993-94.[25] The GCEI was constructed using a hedonic-wage model to capture cost differences in education, with the predominant factor being personnel, for school districts across the United States. Education researchers in a variety of analyses have utilized the GCEI, including Imazeki and Reschovsky's work in rural education settings (2003).

Given the general acceptance of the hedonic-wage methodology by NCES as a cost-based way to adjust for regional differences in the price of education services and the education-research community in its use of the GCEI and TCI, we propose the use of a hedonic-wage-based model to recognize the cost differences to Wyoming school districts. To that end, a regional cost adjustment model using the hedonic-wage methodology was created a few years ago Wyoming school districts. Godby (2003) developed a regional cost adjustment based on the hedonic-wage methodology using Wyoming teacher compensation data and data specific to Wyoming schools and communities.

[25] The GCEI can be downloaded from the U.S. Department of Education's National Center for Education Statistics at http://nces.ed.gov/edfin/prodsurv/data.asp. The author found substantial consistency in cost differences between geographic regions over time.

A Hedonic wage index in Wyoming would include, among others the following factors:

- A worker cares about the benefits and monetary compensation they receive;
- A worker's own personal qualifications will influence the amount they are willing to accept in salary. Such qualifications include years of experience and educational attainment;
- A worker will care about the conditions in which they work. For a teacher, conditions that matter include characteristics of the classroom, including pupil-teacher ratio, and characteristics of the student population;
- A worker will care about the characteristics of the community in which they work. These characteristics can be measured directly by considering such community characteristics as local climate, distance to metropolitan centers, national parks, mountains or other natural features deemed potentially important to personnel, and population density characteristics, which allow on to proxy the presence of local services such as theaters, restaurants, [health care facilities], and retail outlets.

Godby pointed out in his analysis that the amount of funding variation that exists using the comparative WCLI between the highest and lowest funded districts was 59.6 percent. Using the hedonic, cost-based analysis, funding variation was 29.4 percent. This arises, primarily, from the fact that the comparative WCLI is biased towards larger, more urban districts not recognizing the "disamenity" costs associated with smaller, more rural and sparse areas of the state. In addition, the comparative WCLI, as a price index, does not recognize the nonmonetary rewards garnered by those teachers who enjoy the amenities close to their place of work or the working conditions that may or may not be more desirable causing salaries to move upwards or downwards to compensate.

The U.S. Department of Labor's Bureau of Labor Statistics articulates that price indices such as the consumer price index (CPI) or the comparative Wyoming Cost of Living Index (WCLI) should not be seen as cost-of-living indices. Price indices such as the comparative WCLI, by definition, only reflect the prices of goods and services, not the true costs of living in a given geographic location. These are more-accurately reflected in methodologies such as a hedonic-wage index.

The U.S. Department of Education's National Center for Education Statistics recognizes the methodology as appropriate to estimate cost differences across geographic locations. A Geographic Cost of Education Index (GCEI) has been developed for NCES on more than 14,000 school districts across the nation. A similar methodology has been employed by the state of Texas to reflect the teacher cost differences across the state.

Regional cost adjustment recommendation. Given the general acceptance of the hedonic-wage model by the U.S. Department of Education and the education research community, and its use in Texas, we recommend the state move away from the comparative WCLI as the state's regional cost adjustment for funding schools to an hedonic wage-based index. We believe such a model, given the availability of the data to construct this model, more accurately captures the regional costs across the state of Wyoming while not relying on prices alone.

To this end, we asked Dr. Bruce Baker to construct a more current Hedonic-wage index for Wyoming. His analysis is contained in Appendix E which also includes a comparison of the Baker hedonic index with the WCLI. We recommend that the hedonic-index Baker created be used in the new Wyoming School Funding model.

At its August 23rd meeting, the Select Committee approved this approach and encouraged the consultants to proceed with its hedonic wage index analysis for use as the regional cost adjustment in the new school finance formula.

CONCLUSION

As Wyoming policy makers know, school finance issues and structures are constantly changing. As a result, the state has determined that its funding system should be recalibrated every five years in order to remain adequate, equitable and relevant. Wyoming's recalibrated school finance system provides districts and sites with resources so education leaders can deliver the education basket for the purpose of improving student academic performance.

The key role for the state is to determine the appropriate level of resources for each school and each school district and devise a cost-based method – a recalibrated Block Grant – for allocating the funds to districts. Districts must then allocate these resources to schools in a way that ensures that each school has adequate dollars for meeting the needs of its students. Schools must then use these resources for implementing the most effective educational strategies.

As stated several times above, one cannot overstate the importance of the need for schools to transform these resources into powerful and effective instructional strategies that boost student achievement. As Cohen, Raudenbush and Ball (2002) so eloquently argue, school resources are "inert" unless and until they are transformed into high quality instructional practices. Therefore, for the resources specified above to have more than just marginal impacts on student learning, several important steps must be taken. First, schools need to use the dollars to purchase and implement effective curriculum programs in all content areas. Second, principals need to organize schools to support the instructional leadership that research shows is so important (Hallinger & Heck, 1996, 1998). Third, school leaders must help teachers create a professional school culture that focuses on continuously improving the instructional program and having teachers take responsibility for the impacts of their instructional practice (Louis, Kruse & Marks, 1996; Louis, Marks & Kruse, 1996; Louis & Marks, 1998; Newmann & Associates, 1996). And

finally, an intensive and effective professional development program needs to operate in ways to continually improve the instructional program.

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APPENDIX A

Other State Professional Judgment Study Recommendations

In this Appendix, we compare the staffing and resources proposed above with similar prototypical school proposals that emerged from several recent professional judgment approaches to determining adequacy in several states around the country. We have selected five other studies, one completed by Picus, Odden and Fermanich (2003) for the state of Kentucky, and four completed by the firm of Augenblick and Meyers during the past several years for Kansas, Nebraska, Montana, and Maryland (Alexander, Augenblick, Driscoll, Guthrie & Levin, 1995; Augenblick, 1997, 2001; Augenblick, Myers, Silverstein & Barkis, 2002; Meyers & Silverstein, 2002). Tables A1, A2 and A3 display the characteristics for each of prototypical elementary, middle and high schools.

Table A1
Summary of Resources for Prototypic Elementary
Schools from Professional Judgment Panels in Several States

School Element	Kentucky, Picus & Odden	Kansas, Augenblick & Meyers	Nebraska, Augenblick & Meyers	Montana, Augenblick & Meyers	Maryland, Augenblick & Meyers
School configuration	K-5	K-5	K-6	K-5	K-5
School size	400	430	350	360	500
Class size	~20	~20	~17.5	~21	~15
Full day kindergarten	Yes	Yes	Yes	Yes	Yes
Length of teacher work year	200 days				
% Disabled	10 % moderate	14 %	13 %	12 %	13.5%
% Poverty (free & reduced lunch)	50 %	36 %	32 %	24%	31 %
% ELL	~ 4 %	4 %	5 %	5 %	3 %
% Minority	--	---	---	5 %Native American	46 %
Principal	1	1	1	1	1
Assistant Principal	0	0	0	0	1
Instructional Facilitators/Mentors	1	0	0	0	1
Teachers	24	22	20	17	33
Specialist teachers	~5	4.4	2	3	6
Aides	8	1	0	3.5	15
Teachers for struggling students	1/each 25% poverty: 2	4	1	0	0
Teachers for students with disabilities	5	6	3.5	3.2	5.5

Table A1 (Continued)
Summary of Resources for Prototypic Elementary Schools from Professional Judgment Panels in Several States

School Element	Kentucky, Picus & Odden	Kansas, Augenblick & Meyer	Nebraska, Augenblick & Meyer	Montana, Augenblick & Meyer	Maryland, Augenblick & Meyer
Teachers for ELL students	1	1	1	Extra 24 % for each Native American student	0
Teachers for gifted students	0	0	0	0	0
Aides for categorical students		10	6	4	6
Pupil support staff	3	3	2.1	1.6	7
Librarians/media specialists	Included in specialists	1	1	1	1.5
Technology resource teachers	1	1	0.5	1	2
Substitutes	1 permanent plus additional funds for typical use	2 permanent	10 days for each professional staff	$19,800	3 permanent
Professional development	10 summer days included in 200 day year, plus $500/teacher	5 days plus $500/teacher	5 days plus $200/teacher	8 days	10 days
Technology	$265/pupil	$250/pupil	$250/pupil	$275/pupil	$160/pupil
Instructional materials, equipment, student activities	$250/pupil	$270/pupil	$90/pupil	$300/pupil	$205/pupil
Teacher salary levels	National Average	State average	State average	State average + 4.4 % to comparative state average	State average + 1.6 % to comparative state average

Table A2
Summary of Resources for Prototypical Middle Schools from Professional Judgment Panels in Several States

School Element	Kentucky, Picus & Odden	Kansas, Augenblick & Meyer	Nebraska, Augenblick & Meyer	Montana, Augenblick & Meyer	Maryland, Augenblick & Meyer
School configuration	6-8	6-8	7-8	6-8	6-8
School size	500	430	680	630	800
Class size	20	~22	~20	~25	~22
Length of teacher work year	200				
% Disabled	10 %	14 %	13 %	12 %	13.5%
% Poverty (free & reduced lunch)	50 %	36 %	32 %	24%	31 %
% ELL	~4 %	4 %	5 %	5 %	3 %
% Minority		---	---	5 %Native American	46 %
Principal	1	1	1	1	1
Assistant Principal	0	1	1	1.5	3
Instructional Facilitators/ Mentors	1	0	0	0	0
Teachers	25	19.5	24	25	36
Specialist teachers	20 % more: 5	6.5	20	10	9
Aides		1	0	6	10
Teachers for struggling students		4	3	0	0

Table A2 (Continued)
Summary of Resources for Prototypical Middle Schools from Professional Judgment Panels in Several States

School Element	Kentucky, Picus & Odden	Kansas, Augenblick & Meyer	Nebraska, Augenblick & Meyer	Montana, Augenblick & Meyer	Maryland, Augenblick & Meyer
Teachers for students with disabilities	7, plus 1 more if % poverty > 75%	7	5	6.25	7
Teachers for ELL students	1	1	2	Extra 24 % for each Native American student	0
Teachers for gifted students	0	0	0	0	0
Aides for categorical students	0	13	8	7	6
Pupil support staff	4.5	3.8	4.8	3.2	10
Librarians/media specialists	1	1.5	1	1.5	2
Technology resource teachers	1	1	1	1.5	2
Substitutes	1 permanent Plus dollars for more	3 permanent	10 days for each professional staff	$34,650	3 permanent
Professional development	10 summer days included in 200 day year, plus $500/teacher	5 days + $500/teacher	5 days + $200/teacher	8 days	10 days
Technology	$265/pupil	$250/pupil	$250/pupil	$275/pupil	$137/pupil
Instructional materials, equipment, student activities	$250/pupil + $60/pupil for extra duties for teachers	$465/pupil	$190/pupil	$600/pupil	$305/pupil
Teacher salary levels	National Average	State average	State average	State average + 4.4 % to comparative state average	State average + 1.6 % to comparative state average

Table A3
Summary of Resources for Prototypical High Schools from Professional Judgment Panels in Several States

School Element	Kentucky, Picus & Odden	Kansas, Augenblick & Meyer	Nebraska, Augenblick & Meyer	Montana, Augenblick & Meyer	Maryland, Augenblick & Meyer
School configuration	9-12	9-12	9-12	9-12	9-12
School size	800	1150	1900	1300	1000
Class size	20	~23	~19	~20	~17
Length of teacher work year	200 days, including 10 summer PD days				
% Disabled	10 %	14 %	13 %	12 %	13.5%
% Poverty (free & reduced lunch)	50 %	36 %	32 %	24%	31 %
% ELL	~4 %	4 %	5 %	5 %	3 %
% Minority	--	---	---	5 %Native American	46 %
Principal	1	1	1	1	1
Assistant Principal	1	3	6.5	3	5
Instructional Facilitators/ Mentors	2	0	0	0	0
Teachers	40	49.5	120	81	69
Specialist teachers	20% more: 8	14.5	--	--	--
Aides		2	--	6.5	4
Teachers for struggling students	8	10	8	0	0

Table A3 (Continued)
Summary of Resources for Prototypical High Schools from Professional Judgment Panels in Several States

School Element	Kentucky, Picus & Odden	Kansas, Augenblick & Meyers	Nebraska, Augenblick & Meyers	Montana, Augenblick & Meyers	Maryland, Augenblick & Meyers
Teachers for students with disabilities		15	14	12	8
Teachers for ELL students	2	2	5	Extra 24 % for each Native American student	0
Teachers for gifted students	0	0	0	0	0
Aides for categorical students	--	24	13	14	7
Pupil support staff	8	7	11	7	8
Librarians/ media specialists	2	2	2	2	2
Technology resource teachers	2	1	1	2	2
Substitutes	2 permanent + typical use for illness and PD	9 permanent	10 days for each professional staff	$80,000	6 permanent
Professional development	10 summer days included in 200 day year, plus $500/teacher	5 days + $500/teacher	5 days + $200/teacher	8 days	10 days
Technology	$264/pupil	$250/pupil	$250/pupil	$275/pupil	$162/pupil
Instructional materials, equipment, student activities	$150/pupil plus $120/pupil for extra duties for teachers	$635/pupil	$530/pupil	$900/pupil	$850/pupil
Teacher salary levels	National Average	State average	State average	State average + 4.4 % to comparative state average	State average + 1.6 % to comparative state average

APPENDIX B

Research Synthesis on Multi-Age Student Grouping

Research differentiates between *multi-grade* (combination classes) and *multi-age* classrooms. Schools typically implement multi-grade or combination classrooms as a matter of convenience, with two or more grades of students combined into a classroom for administrative purposes, such as a method to manage low or unbalanced enrollments. Schools usually use multi-age classrooms for purposeful pedagogical or curricular strategies based on some criteria, such as the belief that ability grouping leads to greater student achievement. This distinction is important as research shows differential effects based on why students traditionally separated by grades are combined in a classroom and how such groupings are organized (Veenman, 1995; Gutierrrez and Slavin, 1992).

Multi-grade structures, the prevalent schooling structures of the 19th century, have found resurgence in recent years. Declining urban and rural enrollments and burgeoning suburban enrollments have forced many schools to offer instruction to students in different grades within the same classroom. Research on multi-grade classrooms in which a teacher retains separate grade-level specific curriculum for students of different grades within the same classrooms shows little evidence of improved student learning. Veenman (1995) synthesizes 56 research studies, 34 of which reviewed multi-grade classrooms. The mean effect size of multi-grade vs. single-grade classrooms was .00, indicating no statistically significant differences between the two organizational structures. In a review of Veenman's (1995) research, Mason and Burns (1996) suggest when taking into consideration selection bias, these studies actually reflect a negative effect (**-0.10 ES**), of multi-grade or combination classrooms on student achievement.

Schools employ *multi-age* classrooms, a subcategory of multi-grade classrooms, for various reasons. Goodland & Anderson, (1987:3) argue that in the typical first grade classroom, there is "an average four-year spread in the readiness of the students to learn; a spread that only widens as students advance through the elementary grades." This situation, coupled with attempts to limit social promotion and retention, has led many schools to implement multi-age instruction.

Veenman (1995) also finds insignificant differences between multi-age and single-grade classrooms in terms of cognitive achievement. Slavin (1987) suggests that program features, especially the way in which students are grouped and the teacher's instructional strategy, have a great impact on whether a multi-age strategies are successful. Gutierrrez and Slavin (1992), recognizing the mixed research on effectiveness of multi-age classrooms, review 57 studies of elementary school students, breaking out effects by intervention strategy: Joplin Plans, comprehensive programs, and individualized programs.

Schools using Joplin Plans group similar-ability students, despite grade or age, in a single subject for instruction while other subjects are taught in a traditional setting. These programs tend to use a level system with numerous groupings and move students through the levels based on assessment results. Research, primarily studies on reading achievement, shows positive effects for students in these programs. Students instructed in programs similar to Joplin Plans experienced an **effect size** of around **+0.46** over those in traditional graded classrooms.

Comprehensive programs involve the teaching of more than one subject in a multi-age setting. Students are regrouped frequently according to their academic progress, which increases the homogeneity of instruction as students are more likely to be at similar levels of subject knowledge and skill (Decotis & Tanner, 1995). When comprehensive programs are used as a

way to provide teachers the opportunity to deliver direct instruction, students progress quicker than their single-grade classroom counterparts. Out of 14 comprehensive programs studied, 10 showed positive effect sizes, 3 negative, and 1 no effect. **Positive effect sizes** ranged from **0.11 to 0.49**. When the program strategy included elements of student-led instruction, effect sizes were smaller or negative, though students in older grades had greater effect sizes than in younger grades, suggesting students may need some level of maturity in order to take advantage of these features.

When programs involve multi-age settings coupled with an emphasis on student-led learning, what Guitierrez & Slavin (1992) call individualized instruction programs, similar student achievement gains against peers were not made. A review of 6 studies of the University of Wisconsin Individually Guided Education (IGE) program shows statistically insignificant differences between individualized instruction classrooms and single-grade classrooms (+0.11 ES).

In summary, research on multi-grade and multi-age classrooms is mixed on effectiveness, and this mix is tied to the strategy of curriculum and pedagogy chosen for the intervention. If a school or teacher chooses to simply teach two separate curriculums to two different grades of students within one classroom, research suggests effect sizes are negative or insignificant. If a school or teacher chooses to differentiate curriculum based on the knowledge or skills of students and the instructor uses the opportunity to increase the quality and duration of direct instruction, research suggests effect sizes can be positive and significant. So, in general, research suggests students in multi-age classrooms do as well or better than students in age segregated classrooms (Pavan 1992).

APPENDIX C

Costs of the Milken TAP Program, and Relationship to Instructional Facilitators

At the Select Committee's request, we sent an inquiry to the President of the Milken TAP Foundation about the costs of the TAP program for Wyoming. The following is the reply we received:

"All cost factors of TAP are interrelated and not attributable to one particular element of TAP. Further, the cost of TAP is somewhat variable depending on the specific design employed. TAP costs are sensitive to school size (the number of students), the student/teacher ratio and current staffing configuration (e.g. if there are many specialist positions that already exist, then additional funds needed will be lower). As the school size falls, costs per student will rise. In determining the per pupil costs of TAP, the following cost factors must be taken into account.

Cost factors associated with TAP

- Mentor and master teacher augmentations
    - This is their stipend for taking on the new role and responsibilities and also takes into account additional days/hours that will be worked.
- Master teacher replacement costs
    - Frees up the master teachers for professional development, evaluations, etc.
- Size of performance awards
    - We establish one bonus pool from which the awards for school-wide and individual teachers are made. It is a per/teacher bonus pool.
- Planning time (specialists, learning guides and/or schedule change)
- *Additional testing needed ,value-added calculations, training/additional contract days*[26]

Questions you posed:

"And how much more is needed for the overall professional development, as they see TAP as really emphasizing PD."

- These costs are part of the above cost factors through the hiring of master and mentor teachers, paying for replacement teachers and paying for specialists who free up time during the day for teachers to meet.

"The cost of assessing individual teacher performance using your standards and rubrics. How often is each teacher's practice assessed, and what is the approximate cost of such assessment either in terms of time of assessors or costs."

- Again, these costs are part of the above costs factors. The evaluations are conducted 4-6 times annually by the principal, master and mentor teachers.

[26] An additional costs that may be required depending on the schools is additional contract days for teachers who participate in trainings outside of the established work year. Also, the costs of additional testing (if necessary) and value-added calculations (approximately $2/pupil) were not included in the original figures, however, they are of minimal expense and their effect on overall cost is negligible.

TAP Costs in Wyoming

We have computed a cost estimate for Wyoming (on the next page) based on our experiences in other places. If additional funds were available we advocate increasing master and mentor teacher stipends and also the performance award pool. In some cases, for example, a school may already have a specialist teacher and therefore doesn't need "new" funds. This would allow for increasing say mentor teacher stipends.

Cost Estimate of TAP
in an average Wyoming K-6 school

Assumptions	
Number of Teachers	25
Number of Students	500
Number of Master Teachers	2
Number of Mentor Teachers	6
Master: Career Teachers ratio	1:12.5
Mentor: Career Teacher ratio	1:4
Master Augmentation	$8,000
Mentor Augmentation	$4,000
Performance Award Pool	$2,500
Cost Calculation	
Master Teacher Augmentation (2x$8,000)	$16,000
Mentor Augmentation (6X$4,000)	$24,000
Master Teachers Replacement (2 teachers @ $35,000)	$70,000
Specialist (1 @ $40,000)	$40,000
Bonus Award Pool (25x$2,500)	62,500
Total	$212,500
Cost of TAP/student	$425

APPENDIX D

Further Evidence on Geographic Cost Indices

One issue that Wyoming and many other states have grappled with is the varying purchasing power of the education dollar across school districts. In fact, this is been a complex technical and political issue for school funding in Wyoming. Without getting into the details, either conceptually, fiscally, politically or legally, Wyoming now uses a cost-of-living index that the state has developed. And the Wyoming Supreme Court has required that this index be used unless there is a good rationale for change.

Our professional judgment is that there are serious flaws in using a regional cost of living adjustment in a school aid formula, the major one being that such an index is meant to quantify the varying purchasing power of the dollar for individual expenditures but not for school district expenditures. And the fact is that school districts purchase a different basket of goods than individuals. Our general conclusion is that Wyoming would be better served by using an hedonic wage adjustment in the school aid formula, rather than the Wyoming regional cost of living index that is currently used. As background, the Committee should know that one consultant, Allan Odden, has been involved with economists developing such hedonic approaches for school aid formulas for nearly 30 years, beginning with Missouri in 1976.

Rather than make the argument on our own, we quote below from the most current study of appropriate ways to adjust for the varying purchasing power of the education dollar, a study conducted for the state of Maryland by economists William Duncombe, Syracuse University, and Dan Goldhaber, University of Washington (Duncombe & Goldhaber, 2005: 3-15). The

following long quoted section identifies the major ways these adjustments are made and the advantages and disadvantages of each approach:

> There is widespread agreement on both the need for geographic cost adjustment, and on the basic principles used for such adjustments. As summarized by McMahon (1996),
>
> Conceptually, what is needed for determining the regional cost differences, either within states or among states, is a measure of price differences that determine the unit costs of purchasing a standardized market basket of inputs of fixed quality. The inputs purchased are specific to those needed to produce education by the district…These prices *should not be subject to the control of the school district or the state*... (p. 95)

Conceptual Foundation

The objective of these measures is to capture price differences across school districts for the resources school districts purchase to provide educational resources. It is particularly important to identify the different salaries/wages that districts have to offer personnel of similar quality, because compensation typically represent more than 80 percent of district operating budgets. The geographic cost of education index (GCEI) measures how much a district will have to pay for similar educational resources compared to the average district. An index value greater than 110, for example, indicates that the district must pay 10 percent more than the average district, and an index of 80 indicates a district must pay 20 percent less than the average district. The GCEI can be put directly into the most common type of general operating aid formula in education, the foundation formula. [27] Prices of resources that school districts pay for personnel, supplies, equipment, facilities, etc. can differ across school districts for several reasons.

Cost of living

It may be more expensive for employees too live and work in certain areas than others because of the price of housing, energy costs, and medical care. The more expensive the area for employees, the more the school district will have to pay to attract equally skilled employees from lower cost areas. Besides salaries, school districts in some areas may have higher energy costs, construction costs, and land prices. In addition, very small districts may have to pay higher prices for supplies and equipment due to lack of volume discounts. However, many states are now providing small districts access to cooperative purchasing arrangements with larger governments so this should less of an issue. Indices measuring cost of living differences would ideally focus on the major resources consumed by local governments.

[27] A foundation formula takes the difference between the "foundation amount," which measures the cost of providing an adequate education, and the expected local contribution. Estimating the foundation amount can involve calculating the required per pupil spending to meet the standard in the average district multiplied by a GCEI and an adjustment for differences in student needs.

Working conditions

Particularly for personnel the required salary to attract an employee of a given quality will depend in part on the working conditions in the school, and classroom. Research on the mobility of teachers, which represent the vast majority of school district employees, indicates that their employment decisions can be quite sensitive to working condition factors (Hanushek et al., 2001 and 2004). Some of the working conditions which teachers care about are within school district control, including school size, class size, professional development spending, availability of instructional materials, school leadership and culture, to name a few. Districts can choose to trade off spending on factors related to working conditions against increased teacher compensation. Other factors affecting the working conditions for teachers, such as student socio-economic background, and school district size, are outside school district control. Ideally, the GCEI would reflect working condition factors outside of school district control to avoid providing school districts incentives to allocate their budget in a certain way.

Labor markets

Local labor markets can also affect the salaries districts are required to pay. For example, if the unemployment rate in an area is high, particularly for professionals, then teachers (and other education professionals) may have relatively limited choices of alternative jobs. New teachers on the market will be more apt to accept jobs with lower salaries and/or less desirable working conditions. The unemployment rate in the private sector is out of district control, and may be negatively associated with education salaries.
Some studies of teacher labor markets have looked at whether a particular school district or private employer in an area is able to exert market power by dominating the labor market. If one district dominates the labor market, then it can affect the salary paid to teachers in the local area. The higher the market power a district has the lower the salary it should be able to pay.

Amenities of the area

Some areas may be more desirable places for people to live than others. Employees may be willing to accept lower salaries because of higher amenities. For example, if an area has a very desirable climate or is located close to a beautiful shoreline, employees may be willing to sacrifice some compensation to have ready access to these amenities.
Offsetting the direct impact on salaries is the effect of amenities on housing prices, which tend to be higher in areas with positive amenities, as immigrants bid up housing prices in the area. Some of these amenities could include: urban amenities, such as access to cultural events, and business services; recreational services, such as proximity to coastline, lakes, mountains, and parks; transportation services, such as access to good highways, airports, and rail transportation; and public services, such as access to good state and/or local services, particularly education. The fact that education spending (and perceived quality) is often capitalized into housing prices poses a problem with using

housing prices directly as a measure of cost of living. Housing prices are not an external factor affecting costs in school districts, but is simultaneously determined with decisions over school district budgets.

Methodologies

While there is consensus on the broad objectives of geographic cost adjustment, several different approaches have been developed for estimating GCEI. Specifically, these approaches differ in whether they focus on prices for good or services, or wages, and whether they account for working condition differences for personnel. For each method, we will explain the general methodology, and the strengths and weaknesses of the method.

Cost of Living Index

The cost of living approach estimates the price differences for a "market-basket" of foods and services purchased by a typical consumer. The market basket is usually defined as broad consumption categories (food, transportation, utilities, etc.), and data are collected on their prices across geographic areas. The final cost of living index is a weighted average of prices based on their relative importance in the market basket. While there are a few estimates of cost-of-living at the national level, they are either for a selected set of metropolitan areas or at the state level.[28] States such as Colorado, Florida, and Wyoming have developed and used this type of cost-of-living index in their school aid calculations (Rothstein and Smith, 1997; Florida Department of Education, 2002; Wyoming Division of Economic Analysis, 1999; Colorado Legislative Council Staff, 2002).[29] The geographic unit for construction of the index is counties for Florida and Wyoming, and counties and their neighbors for Colorado. In Maryland, the cost-of living index developed by the Department of Business and Economic Development (DBED) will be discussed in more detail below.

Methodology: Typically, four steps are involved in developing these indices. First, the state must identify the "market basket" of goods and services consumed by the typical consumer, or used by the government in providing services. Ideally for the GCEI the market basket would be of inputs used to provide educational services; however, in practice a consumer market basket is typically used. It is particularly import to include commodities that are likely to experience a significant variation in prices across places,

[28] Presently, the only widespread cost-of-living index available nationally is produced by the nonprofit organization, ACCRA (formerly affiliated with the Chamber of Commerce). ACCRA utilizes local communities to voluntarily submit price information to ACCRA, and the sample of communities in the index varies across time. Nelson (1991) and McMahon (1996) have developed cost-of-living indices using simple supply and demand models. They estimate cost of living (as measured by ACCRA) as a function of income, housing prices, and population change. Based on this simple model, they have predicted the cost of living for geographic areas not in the sample. Because both income and housing prices have a positive coefficient in the model, this method leads to higher cost of living in high income and high wealth communities, which works against the wealth equalizing objectives of most school aid formulas.

[29] A description of geographic cost adjustments used in other states is presented in Appendix A.

such as housing costs, medical expenses, and energy costs. Second, for each factor in the market basket, price data needs to be collected for each geographic area. This can be the most time intensive and expensive part of the process and states commonly hire a firm to collect this information. For each item in the market basket, a price index compared to the state average is calculated. Third, the share of the typical consumer's (or government's) budget spent on each item is calculated using either data on average school district expenditure data by object of expenditure, or information on consumer budget shares, typically from the Bureau of Labor Statistics.[30] The cost-of-living index is the weighted average for each factor in the market basket of the price index multiplied by the budget share. The final calculated index is then often divided by the state average calculated index (and multiplied by 100) so that the index is center at 100.

Strengths: The principal strengths of the cost-of-living approach are its conceptual simplicity, and that it focuses particular attention on cost of living differences. States, such as Florida, Colorado, and Wyoming, have collected detailed price information on geographic areas, which can be valuable information for other applications (e.g., determining social service funding). Because consumer prices are presumably outside school district control, cost of living indices cannot be influenced by district decisions.

Weaknesses: To apply this consumer oriented cost-of-living measure to education, it is necessary to assume that the cost of resources in education is going to reflect underlying price differences for a market basket of consumer goods. However, the commodities in a consumer basket and their associated budget shares may not reflect very closely the budget of a school district. Even if we assume that this bundle reflects the spending patterns of a typical school employee, school personnel do not necessarily shop or live where they work.[31] Cost of living for consumer products does not necessarily reflect the pay differentials that a district will have to offer to attract teachers, because they do not consider working conditions in a district. Two districts with the same cost-of-living for consumers may have to pay different salaries to attract the same teacher, because of differences in working conditions.

Competitive Wage Index

Another approach for determining geographic education cost differences is to focus on the principal resource used in providing education services—personnel. Competitive wage indices have either used education salaries, or salaries in similar private sector occupations to construct the index. Using data on average payroll by either industrial sector or occupation, it is possible to construct an average private sector wage in similar occupations (Rothstein and Smith, 1997). States such as Ohio, Massachusetts and Tennessee have used measures of average private wages as cost adjustments in their foundation programs (Rothstein and Smith, 1997; Massachusetts Department of

[30] Budget shares can either be calculated using the *Consumer Expenditure Survey* produced by the BLS or using the market basket and weights used to construct the *Consumer Price Index* (CPI).

[31] Colorado has recognized this fact by calculating cost of living for "labor pool areas." Labor pool areas are designed to reflect where teachers in the district live, rather than where they work.

Education, 1999; Eff and Eff, 2000).

Methodology: There are several approaches to measuring wage differentials across districts. In his comprehensive review of cost adjustments, Barro (1994) constructs a simple comparison across states of the salary of a teacher (or other professional staff), which is used to construct a personnel cost index. Data is collected on for education professional and non-professional staff for a given education and/or experience level for each school district. Using the state average budget share for each type of employee, a composite wage can be calculated as a weighted average. If district-level salaries are used, this index will reflect district discretionary decisions, which provides an incentive for districts to overpay their employees. To mitigate this possibility it is preferable to use average salaries at the county or regional level.

The second approach focuses on private sector salaries in comparable occupations, typically professional, managerial, or technical (Rothstein and Smith, 1997). The major source of this information is the *Occupational Employment Survey* (OES) published by the U.S. Bureau of Labor Statistics. The data is available for labor market regions in a state, which are typically based on metropolitan statistical areas, and combinations of non-MSA counties. Once the comparable occupations are selected, average wage or salary and the employment shares (percent of total private employment) for each occupation are collected, and used to construct a weighted average private wage.

Strengths: The strength of the competitive labor market approach is the direct link of the cost index to personnel costs, which represent the large majority of a school district's budget. Assuming the private labor market is large enough, private salaries should not be influenced by school district salary decisions. Private wages should reflect differences in cost of living in an area, and availability of amenities, both of which should affect teacher salaries as well, but there is no reason to expect that factors affecting working conditions in education (at-risk children, old buildings) will necessarily affect working conditions for private employees. The competitive wage index is simple to calculate, and is intuitive to most policymakers.

Weaknesses: The principle drawback to this methodology is that average county education salaries or private sector salaries are not likely to reflect differences in working conditions for teachers across districts, and such conditions have been shown to have a significant influence on teacher employment conditions (Hanushek et al., 2004). For the education salary index approach wages even at the county level may reflect inefficiency if most districts in the county (or region) overpay staff. For the comparable private salary index, the OEM is available only for labor market areas, which implies that the private salary index does not capture some localized amenities, and differences in resource prices within the labor market area. A key assumption of private salary indices is that public sector salaries and spending in education do not influence private sector salaries. While the link between public and private sector labor markets are complex and not well understood, public schools are often one of the major employers in an area. The use of private salaries for labor market areas should reduce the potential endogeneity of private sector wages.

Hedonic Salary Indices

Hedonic wage models incorporate elements of both the cost-of-living approach and the competitive labor market methods. The conceptual basis of this approach is summarized by Chambers (1981),

The intuitive notion underlying this theoretical structure is that individuals care both about the quality of their work environment as well as the monetary rewards associated with particular employment alternatives, and that they will seek to attain the greatest possible personal satisfaction by selecting a job with the appropriate combination of monetary and nonmonetary rewards. (p. 51).

Similar to competitive wage market methods, hedonic models attempt to capture factors affecting the local labor market. One of the factors affecting relative wages is local cost-of-living differences such as housing prices. What sets this approach apart from the other two methods is that it also tries to capture the impact of working conditions in education on the required salaries for professional staff. Only one state, Texas, presently uses this approach to determine cost of education differences (Alexander et all, 2000). Hedonic salary studies have been done for several other states (e.g. Alaska, Maryland, and New York).[32]

Methodology: The hedonic salary approach involves estimating a multiple regression model where employee salary (or salary plus fringe benefits) is the dependent variable. The first step in the process is to collect data to use the model. Commonly data on individual teachers is used, including salary (and possibly fringe benefits), and other teacher characteristics that are supposedly related to teacher quality, such as experience, education, certification status and test performance, and quality of college attended. In addition, data is collected on factors at least partially within district control related to working conditions, including class size, school size, and characteristics of students and teachers in the school. Finally, data is collected on school district or community characteristics that are outside of school district control, such as socio-economic background of students, community demographics, unemployment rates, crime rates, housing prices, private sector wages, and community amenities. Typically, data is collected for several years.

Several different regression methodologies have been employed for hedonic salary models to correct for potential biases in regression coefficients and standard errors.[33] The coefficient on each independent variable could be viewed as a measure of

[32] See Duncombe and Goldhaber (2003), and Chambers et al. (2003 and 2004).

[33] The best insurance against biased coefficients is to include in the model all the important factors affecting salaries. Since it is difficult to insure that all the important variables are included in a model, panel data methods can be employed to control for unobservable factors. The most common of these methods, "fixed

the value teachers (or other personnel) attach to that factor. To construct a personnel cost index, the coefficients for discretionary factors are multiplied by the state average value for that factor, while coefficients for outside factors are multiplied by actual values for that district. The sum of these terms is the predicted salary for a employee in a certain district with certain job-related characteristics and average values for discretionary factors. The predicted salary is divided by the predicted salary for a teacher with average characteristics (and multiply by 100) for the teacher salary index for a district.

Advantages: In theory, the hedonic salary indices are the most direct and comprehensive measure of the determinants of geographic differences in education salaries outside district control. Hedonic salary can include all of the major factors affecting salary differences across geographic areas: cost-of-living, labor market factors, working conditions, and amenities of the area. Hedonic models include a number of characteristics of teachers (or other staff) in an attempt to assure that the salaries being compared are for individuals with the same set of relevant job characteristics. Hedonic salary indices are the only type of GCEI that attempts to control for effects of working condition differences across school districts.

Disadvantages: The key assumption behind the development of hedonic wage models is competitive labor markets. Under the competitive labor market theory, any firm overpaying employees will be driven out of business by lower-cost competitors. Thus, competitive labor markets imply that wages reflect the *minimum* required to attract a particular employee into a particular job. In the public sector pressure to maintain efficiency will be more indirect since it must occur either through the pressure of taxpayers on elected officials, or through the loss of population as households sort across communities to find the best package of taxes and public services. If teacher labor markets are not competitive, and teachers in some districts are paid more than necessary to recruit them for a particular position, then the hedonic salary indices may reflect inefficiency across districts rather than the minimum salary required to recruit a teacher.

Because the hedonic salary index is based on the results of a regression, any biases in the regression coefficients can lead to inaccurate estimates of the salary index. For example, the coefficient on the poverty variable in a hedonic should be positive indicating that high poverty districts have more difficult working conditions and will have to pay more to attract equal quality teachers as a low poverty district. However, if measures of teacher quality are incomplete, and controls for inefficiency are inadequate, the regression coefficient on poverty in the hedonic may be negative (or weakly positive), because it

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effects", includes dichotomous variables (0-1) in a model for all school districts and time periods. The variables for school districts control for all factors that are unique to a school district and do not vary across time. Another problem that can affect the accuracy of the coefficients is when causation can run both directions between the dependent variable and an independent variables (commonly called an endogeneity problem). One example is if test scores for a particular grade and school are included as explanatory variables in the salary model. Clearly, some teachers may be attracted to a school with high test scores as a measure of working conditions, and might accept lower wages. However, teacher salaries may be related to the quality of the teacher, which can directly affect test scores. In this case, it is difficult to identify which factor is at work without more information.

may be capturing other factors besides working conditions.

Cost-of-living measures that have been commonly used in hedonic salary models have an array of problems. One of the challenges for all cost of living measures is what is the appropriate geographic unit. Teachers can teach in one district and live in another. Should county, MSA, or regional cost-of-living measures be used instead of measures at the district level? Another issue is whether the cost of living measure reflects discretionary decisions made by the school district. Housing price as a cost of living measure can be problematic because it reflects differences in perceived education quality across districts. If perceived education quality is linked to district spending and teacher salaries, then housing prices would be caused in part by teacher salaries, as well as visa versa. MSA level housing prices might help to eliminate some of the education effect.[34] Private sector salaries can serve as a proxy for cost-of-living, labor market, and some amenities. It is possible these salaries could be endogenous, because public salaries could affect private salaries (and because private and public salaries may reflect some of the same unobservable factors).

In addition, hedonic salary indices often display relatively little variation, because teacher salaries reflect primarily the components of a teacher salary schedule—education and experience. The result are hedonic salary indices that reflect primarily cost of living differences, not working conditions. This runs counter to recent research on teacher labor markets that suggest that teachers are greatly influenced by working condition differences. Finally, hedonic salary models as with any statistical procedures requires sufficient observations (degrees of freedom) to identify the impact of variables in the regression. In a state with few school districts, such as Maryland, the coefficients for only a limited set of district-level variables can be estimated with precision.

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[34] Some hedonic studies have used unimproved agricultural land as a cost of living measure to avoid the potential endogeneity of housing prices. However, agricultural land in central cities or inner ring suburbs often does not exist, and has to be imputed. It is not clear how accurately the imputed values reflect the actual value of unimproved land in a central city. See Chambers et al., (2004) for a description of one method for imputing missing observations.

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APPENDIX E

Development of an Hedonic Wage Index for the Wyoming School Funding Model

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CREATING AN INDEX OF THE COMPETITIVE WAGE FOR HIRING TEACHERS OF COMPARABLE QUALIFICATIONS

This report addresses variations in competitive wages for teachers across Wyoming school districts. It begins with some conceptual background on alternative approaches to estimating competitive wage variation. The report expresses a strong preference for a *Hedonic Wage Model* approach, a regression-based method for estimating the wage required for each district to recruit teachers of similar qualifications. Though the approach has its shortcomings, most economists in education finance have concluded that the strengths of the approach, relative to other alternatives including the currently used Wyoming Cost of Living Index (WCLI), far outweigh the weaknesses.

This paper estimates an hedonic wage model for teacher base salaries using teacher level data from 2002-03 to 2004 – 05. It then compares the findings of that model with the current WCLI.

Conceptual Background

Geographic variations in the prices paid by school districts for educational resources are a function of both discretionary (demand side) and cost (supply side) factors. Discretionary factors are those factors within the control of local administrators, like the choice to hire more qualified teachers at a higher price, or the choice to heat school buildings to 73 degrees instead of 68 degrees during winter. Cost factors are those factors that are outside of the control of local administrators, like the availability of qualified science teachers, local market prices for utilities or for materials, supplies and equipment. The goal in establishing a geographic cost of education index is to identify specifically those cost differences outside of control of local administrators, or, for example, the different costs of a teacher given the same levels of education and experience.

Most analyses and applications of geographic cost differences specifically involve differences in the price of teachers, since personnel represent 80 percent or more of local school budgets (Peternick et al., 1998, in Ladd, Chalk and Hansen, 1999: 125). The National Academy of Sciences report *Making Money Matter* identifies three personnel-based price indices: (1) Barro's (1992) average teacher salary (ATS) index; (2) McMahon and Chang's (1991) cost of living index; and (3) Chambers' (1995) Teacher Cost Index (TCI), which the National Academy of Sciences (1999) report refers to as the "most sophisticated" of existing approaches for "examining national differences in teacher salaries and distinguishing the cost of education from actual education expenditures."(p. 125)

Alternate Approaches

Three basic approaches have been used to estimate differences in competitive wages for teachers across school districts or broader regions within states. The three basic approaches

include (a) cost of living adjustments, (b) competitive wage adjustments and (c) hedonic wage model adjustments.[35]

Cost of living adjustments are intended to compensate teachers for differences across school districts or regions within a state in costs of maintaining comparable quality of living. Cost of living adjustments typically assume some basket of basic goods and services required for individuals or families for attaining a specific quality of living. Goods and services of a specific quality level are identified, and the price differences for purchasing those goods or services are estimated across regions in a state. The basket of goods typically includes things such as housing, food, clothing, childcare and healthcare. The goal of a cost of living adjustment is to provide individuals, in the case of education, teachers and other school employees the ability to have comparable quality of living regardless of the school or district in which they are employed.

At least two major problems exist in using cost of living adjustments for adjusting school aid. First, it is often the case that wealthy, generally more advantaged school districts in and around more desirable locations will show higher costs of the basket of goods and services. Using an index based on such findings results in supporting very different rather than similar quality of life across teachers within a state. One might imagine an extreme case where a cost of living adjustment considers only housing prices and where there are two school districts – one with palatial estates and another, a neighboring slum of decaying multifamily housing units. Funding schools or paying teachers on the basis of the differences in housing unit values, such that the teachers in the affluent district can afford palatial estates and the teachers in the slum can afford to live in the slum clearly supports a different, not similar quality of life. The second is that the index addresses the basket of goods bought by individuals but not by school districts.

States including Colorado, Florida and Wyoming use cost-of-living type indices in their school aid formulas. In Wyoming the Wyoming Cost of Living Index (WCLI) is used to adjust 85 percent of the estimated revenues a district receives through the current school funding model.

Competitive wage adjustments are estimated for teachers by evaluating the competitive wages of workers in other industries requiring similar education levels and professional skills as teachers. To the extent that competitive wages for similar work (at similar levels of experience, education, age, etc.) varies across regions or school districts within a state, so too, it is assumed, that competitive wages for teachers must vary. The underlying assumption is that teacher's wages must be competitive with other local industries requiring comparable skills, or teachers might choose to work in those industries instead of education. Because local labor markets vary, competitive teacher wages must vary.[36]

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[35] For a more complete review with analysis of pros and cons of each method, See William Duncombe and Dan Goldhaber (2004) Estimating Geographic Cost of Education Differences: A Case Study of Maryland. Paper presented at the Annual Meeting of the Association for Budget and Financial Management. Chicago.

[36] For a more thorough discussion of Comparable Wage Indices, See Lori Taylor (2005) Comparable Wages, Inflation and School Finance Equity. Working Paper #540. Bush School of Government and Public Service. Texas A&M University.

Unfortunately, little is known about the mobility of teachers into other supposedly comparable or competitive professions and vice versa, and less is known about the potential role of wages in influencing mobility into and out of the teaching profession from other professions. Podgursky among others (2004: 507) notes: "Examination of non-teaching earnings for exiting teachers finds little evidence that high-ability teachers are leaving for higher pay."

According to Duncombe and Goldhaber (2004), states including Massachusetts, Ohio and Tennessee have used measures of average private wages to construct cost adjustments to school aid. Efforts to do this in earlier recalibration efforts in Wyoming found it difficult to find adequate numbers of individuals employed in occupations that are reasonably comparable to teaching across the state.

Hedonic wage adjustments focus specifically on teachers' employment choices within the field of education and attempt most directly to quantify how to provide each school district with comparable opportunity to recruit and retain teachers of similar quality. A vast body of educational research indicates that teachers' job choices are driven primarily by location and work conditions including but not limited to student population characteristics. Neither cost of living indices nor competitive wage indices addresses work conditions of teachers. Among those work conditions that are typically considered outside of the control of local school administrators are student population characteristics, crime and safety issues and to some extent facilities quality and age. A well estimated hedonic wage index should capture the negative effects of difficult work conditions on teacher choices, resulting in higher index values for the cost of recruiting a teacher of comparable quality into more difficult working conditions, assuming all else equal. This is easier said than done.[37] Other factors beyond the control of local school administrators may include the remoteness of a school district and access to local amenities. Hedonic wage indices also include consideration of cost of living factors. Where cost of living adjustments alone may simply serve to support a better quality of life (rather than similar quality of life) for teachers in more affluent school districts, a hedonic approach can counter some of this effect with work condition and location factors that often contrast with cost of living measures.

Shortcomings of the hedonic approach most often relate to the availability of sufficient, detailed data to capture expected patterns of competitive wage variation in relation to teacher quality. Presently, teacher wages vary both within and across school districts primarily as a function of years of service and degree level, due to the deeply embedded single salary schedule. Sadly, there is little evidence that either years of service or degree level (as typically compensated in the single salary schedule) are good measures of teacher quality. In most cases, the best one can do in estimating a hedonic wage model is to control for these two major factors and then discern the extent that work condition factors and costs of living influence the differences in wages across districts for teachers at similar experience and degree levels. Ideally, available data would include measures of teachers own test scores and/or the selectivity of the undergraduate

[37] See Duncombe and Goldhaber (2004)

institutions attended by teachers – two "teacher quality" factors more frequently associated with improved student outcomes. Even when better teacher quality measures are available, if few or no teachers with strong academic backgrounds work in schools with adverse working conditions it can be difficult to estimate what it would take to get them there.

The State of Texas presently uses an hedonic wage index to adjust teacher salaries in its school aid formula.

NCES Wage Indices

In the 1990s, the National Center for Education Statistics (NCES) commissioned Jay Chambers of the American Institutes for Research (AIR) to develop a national teacher cost index, based on data from the NCES Schools and Staffing Survey's of 1987-88 and 1993-94.

Chambers' Teacher Cost Index (TCI) uses a *Hedonic Wage Model* to estimate differences in the price of teachers across and within states. The wage model estimates cost related differences while holding constant discretionary differences. As discretionary factors, Chambers includes teacher characteristics such as educational preparation, experience levels, composition of teachers with respect to race, gender, age and maturity and job characteristics including class size, subject matter and type of classes. Most of these factors, which involve "who is hired" and "how they are assigned" are within the discretion of local administrators. Administrators may hire more or less experienced individuals, and assign them heavier or lighter workloads.

Chambers' cost factors include those that affect the desirability of a particular geographic location like climate, composition of student enrollment, crime rates and proximity to an urban area. These factors are clearly outside of the control of local administrators, who may, for example have to pay a premium to attract comparable teachers to either a remote rural setting, or low income urban school with high percentages of difficult students and high rates of crime. Chambers' goal, as he states, is to use the equations to conduct a simulation to address the following question:

> *How much more or less does it cost to recruit and employ similar school personnel (i.e. exhibiting similar discretionary factors) in different school districts (characterized by different sets of cost factors) at different points in time (i.e. in different school years)? (p. 258).*

Chambers' also estimates cost indices for administrators, other non-certificated staff and non-personnel (utilities, materials & supplies etc.) costs. Each of these indices attempts to separate cost-related differences from discretionary differences. Chambers then constructs a weighted average of these indices, according to their share of typical school budgets, in order to construct an overall geographic cost of education index, or CEI. A particularly difficult issue in the development or application of wage indices is the identification of all of the relevant factors that might influence whether districts truly have comparable ability to purchase teachers of comparable quality and qualifications. For example, if one district simply has nicer facilities than another, will they have a competitive advantage on teacher recruitment, allowing them to pay the

same, yet attract more desirable candidates? Is the same true of student population differences? Chambers calls these "hedonic wages," or things that add pleasure to your work that you are willing to trade off against higher wages.

More recently, the National Center for Education Statistics has commissioned the development of a *Competitive Wage Index*, based on the Individual Public Use Microdata Sample from the 2000 Census on wages of non-education employees (Taylor, 2005). The resulting indices cast a relatively broad net across rural regions and metropolitan areas, indicating expected variations in competitive wages for teachers, compared to employees of similar attributes. The NCES competitive wage index is not yet available.

Differences in Application: Geographic Units

Among the three approaches, hedonic wage indices are most appropriate for use at the district level where it may be of significant importance to provide districts with the most difficult working conditions locally with the necessary competitive wage to attract teachers of at least minimum desired quality. That is, indices based on hedonic wage models can and should be used to influence within-labor-market, cross-district sorting of teachers, where labor markets might be defined as metropolitan areas or other within-state regions more highly aggregated than individual districts, cities or towns.

Other wage indices, like competitive wage and cost of living indices are problematic when applied to individual districts because they are more likely to have the effect of providing recruitment and retention advantages to those districts already advantaged within labor markets (wealthier suburbs over neighboring poor urban districts in the same metropolitan area). That is, at the micro level, between two neighboring districts in the same region of a state, it would likely be found that housing and other costs are higher or competitive wages higher in the more affluent of the neighboring districts. It would be inappropriate to provide additional incentives to attract teachers to the more advantaged district in the same labor market as other disadvantaged districts. Indeed, poorly estimated hedonic indices that fail to capture additional costs of difficult working conditions suffer the same problem, though usually to a lesser extent.

Instead of district level indices, comparable wage or cost of living indices might be applied to the consolidated metropolitan statistical area (CMSA), or core based statistical area (CBSA) covering a wide array of districts of varied need, but neither compensating for, nor against those needs. The downside of even this approach is that districts in economically depressed regions of a state will likely be assigned lower competitive wage or cost of living indices, making it difficult to ever recruit in new, higher quality teachers from other regions of the state. In effect, the index will reinforce the depressed state of the local economy.

Differences in Application: Integration with Other Adjustments

Ideally, a well estimated hedonic wage index would capture at least some of the additional costs associated with bringing similar quality teachers into more difficult settings. Unfortunately, data issues pertaining to the measurement of teacher quality typically mute if not negate entirely this desired *combat pay* effect. Whether a wage index fully accounts for teacher

quality influences how that wage index should be integrated with other cost adjustments, like additional funding for at risk children.

The underlying premise of providing additional funding to schools or districts serving greater proportions of at risk children is that these children will need more contact with teachers of comparable quality if we expect them to achieve the same outcomes as other children. That is, they need a higher quantity of teachers of similar quality. If the wage index compensates the cost of recruiting teachers of similar quality into schools with more at risk children, then the at-risk adjustment need only compensate for the costs associated with the higher quantity of teachers needed. However, where the wage index does not fully capture additional costs associated with comparable quality, the at-risk adjustment must compensate for both quality and quantity.

Where a metropolitan area comparable wage or cost of living index is used, with no differential for difficult work conditions across districts within the metro area, larger weightings will be needed for at risk and LEP/ELL children in the general aid formula. Student need weights will need to compensate for required differences in both teacher quantity and competitive wages. If a well-estimated hedonic can capture the competitive wage difference associated with disadvantaged student populations, separate weights for at risk and LEP/ELL might be smaller because they need only compensate for teacher quantity differences.

Summary and Conclusion

Given these arguments, the paper concludes that the hedonic approach is the most appropriate method for providing Wyoming school districts comparable opportunity to recruit and retain teachers of comparable quality. This aligns with the conclusion of the recent National Research Council's report on equity and adequacy in education.

Modeling Wage Variation Across Wyoming

This section estimates alternative hedonic wage models for Wyoming school districts. It uses two approaches to capture wage variation across the state of Wyoming. First, the paper estimates a conventional hedonic wage model, using three years (2002-03 to 2004-05) of data on full-time teachers' base salaries. The analysis focuses on base salaries as the core underlying competitive salary structure that requires adjustment for districts to remain competitive with one another in their recruitment of similar quality teachers. Second, using the same salary variable as the dependent measure, the paper estimates a CBSA fixed effect, dummy variable model to capture average differences in competitive wages for teachers across Core Based Statistical Areas (CBSAs).

This section begins with a brief discussion of the Wyoming teacher salary data set used for the subsequent analyses. It then discusses the methods employed for estimating the district level hedonic wage models and the CBSA fixed effect model. The next part presents the findings of the various regression models and district and CBSA level wage indices generated by the models. The next part compares the estimated Hedonic wage indices with other recently estimated Hedonic indices for Wyoming (Godby, 2003) and with the current Wyoming Cost of

Living Index. The section concludes with a policy recommendations regarding the most appropriate index to use in the Wyoming school finance formula.

Wyoming Teacher Data

The following analyses use individual teacher level data on approximately 4,000 teachers, matched over 3 years, for a total of 12,000 cases.. Only full-time classroom teachers, designated to schools were used for the analyses and only teachers working in districts for between 164 and 200 contract days were included. Finally, only teachers who existed in the data set, within the previously established criteria, for all three years were included.

Table 1 summarizes the mean base salaries and mean additional earnings (from schools) of teachers in the final sample. Mean additional earnings include all other school earnings (stipends for coaching or other supervisory duties) attributable to each teacher in the sample (difference between a teacher's total school/district earnings and that teacher's base salary).

Table 1
3-year Wyoming Teacher Panel (Matched Cases over All 3 Years)

year	Teachers	Mean Base Salary	Std. Dev.	Mean Additional Salary	Std. Dev.
2002-03	3,896	$ 39,261	$ 7,390	$ 1,477	$ 452
2003-04	3,896	$ 40,530	$ 7,219	$ 1,476	$ 448
2004-05	3,896	$ 42,471	$ 7,020	$ 1,474	$ 447
Average	11,688	$ 40,754	$ 7,331	$ 1,476	$ 449

Figure 1 provides a geographic view of Wyoming school districts and U.S. Census Bureau Core Based Statistical Areas (CBSAs), which include both metropolitan statistical areas and the relatively new classification of micropolitan statistical areas (areas centered by cities or towns of 10,000 to 50,000 residents). Those areas not contained within a CBSA are designated "rural." Wyoming is divided into 9 CBSAs with large areas outside of CBSAs designated as rural.

Figure 1
School Districts and Core Based Statistical Areas in Wyoming

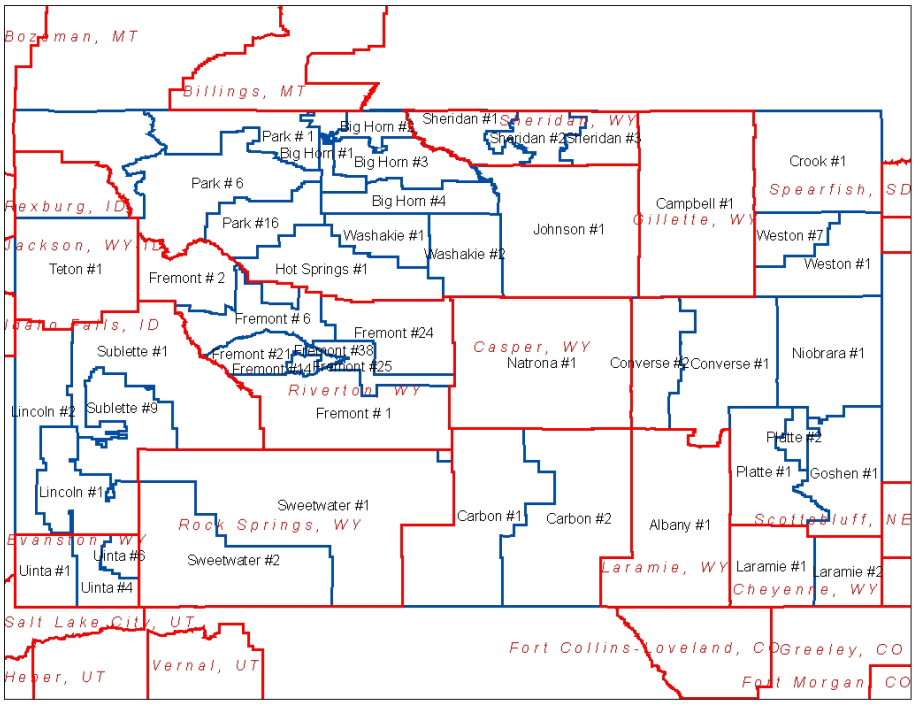

Table 2 summarizes the average teacher base salaries for all 3 years and then for year 3 alone, by CBSA. Note that the largest number of Wyoming teachers in the sample (about 1,200 per year) work in "rural" designated areas. Either across all years or in 2004-05 alone, the highest average salaries are found in Jackson. The range of average salaries runs from about 40,000 to about 46,000, or a 15 percent difference, which is far smaller than the over 50 percent range provided for in the current WCLI. Table 3, does not, however account for experience and degree level differences across CBSAs.

Table 2
Average Salaries by Core Based Statistical Area

	3-year Average			Year 3 (2004-05)		
CBSA	**Teachers**	**Mean Base Salary**	**Std. Dev.**	**Teachers**	**Mean Base Salary**	**Std. Dev.**
Non -CBSA (Rural)	3,557	$ 39,651	$ 6,509	1,182	$ 41,350	$ 6,311
Casper (16220)	1,520	$ 42,434	$ 7,503	507	$ 44,034	$ 7,099
Cheyenne (16940)	1,694	$ 41,091	$ 7,936	567	$ 43,104	$ 7,553
Evanston (21740)	714	$ 40,215	$ 7,200	239	$ 42,227	$ 6,930
Gillette (23940)	1,172	$ 41,904	$ 7,923	392	$ 43,005	$ 7,758
Jackson (27220)	251	$ 44,282	$ 7,874	84	$ 45,891	$ 7,821
Laramie (29660)	527	$ 38,629	$ 7,612	175	$ 40,308	$ 7,304
Riverton (40180)	709	$ 38,667	$ 6,031	237	$ 39,978	$ 5,704
Rock Springs (40540)	928	$ 42,137	$ 6,924	308	$ 43,863	$ 6,276
Sheridan (43260)	616	$ 41,192	$ 7,809	205	$ 43,823	$ 7,246
Total/Average	11,688	$ 40,754	$ 7,331	3,896	$ 42,471	$ 7,020

Modeling Cross-Sectional Variation in Teacher Wages

The goal of the alternative wage equations is to sort out, from the panel of teacher level data, the influence of non-discretionary factors on cross-district, or cross-sectional variations in teacher wages. Though the analysis focuses on teacher base salaries, it includes in the models a measure of district average additional earnings of teachers. This approach is comparable to Godby's (2003) choice to treat net benefits as a district level factor that may influence the likelihood that a teacher will work for a lower base wage. My perception is that teachers are far more cognizant of their potential to generate additional earnings than they are to understand the relative value and quality of benefits. The goal herein is not to model directly those additional earnings as part of a teacher's required competitive wage, but rather, to treat the opportunity for additional earnings as a job factor that might influence the base wage a teacher is willing to accept.

The ability of districts to provide additional earnings opportunities may be contingent on a number of uncontrollable factors. For example, larger districts or districts with more and larger high schools may have far more opportunities to earn stipends for coaching or other activities.

Unfortunately, the data set provided only additional school earnings and not the average earnings of teachers outside of school. One might expect, for example, that teachers would be willing to take a lower base salary for teaching if they could generate substantial additional earnings through other endeavors, like teaching and coaching skiing or working in other tourism and recreation related industries (Tennis, Golf etc., Tour Guide) during the "off-season" (Summer). One might expect these opportunities, where available, to have far greater influence on teacher's acceptance of a particular base wage than much lower additional school earnings (about $1,500 per year). Availability of such opportunities is proxied, in part, by other locational measures in the models such as proximity to Yellowstone or proximity to urbanized areas.

Among the discretionary factors in the model are teacher degree level (teacher holds a masters, or doctorate) and total years of experience, aggregated into categories. All teachers in the sample are full time, but a variable is included to indicate whether the teacher is in a position that was advertised as secondary or high school. A variable is also included to account for differences in annual contract days. Additional preliminary models attempting to identify whether wage premiums existed for math and science or special education teachers were also run, but no such wage premiums were found. Lower wages were found for teachers in the arts. Teachers' race and gender were also included.

District average supplemental pay is partly discretionary – the district chooses to allocate a certain proportion of their budget to supplementary pay opportunities – and partly uncontrollable – the district is big enough or has certain characteristics such that it can provide additional earnings opportunities. A variety of specifications were tested. The analysis ultimately treated district average additional earnings as an uncontrollable factor allowed to vary across districts when predicting competitive base salaries.[38] This approach was taken in keeping with

[38] Among the alternative specifications were attempts to identify a good set of instruments for treating supplemental pay as endogenous in a 2SLS, instrumental variables specification.

the logic that some districts have the advantage of being able to provide more supplemental earnings opportunities not solely as a function of budgetary discretion but as a function of uncontrollable conditions.

Other uncontrollable factors that may influence teachers' decisions include a variety of student population characteristics, such as shares of children in poverty, shares of LEP/ELL children, shares of children with high incidence, low severity disabilities and low incidence, high severity disabilities and student outcomes. Ultimately, not all variables are included in all models. Those listed as "dropped" do not appear in the models reported herein.

The final models that were estimated replaced poverty shares and LEP/ELL shares with school level unduplicated "at risk" counts averaged across 2003-04 and 2004 – 05. This is the same count method as used in the re-calibrated block grant model. Because data were limited to the final two years of the panel, 2002-03 data were dropped from the final analyses.

Finally, a number of locational factors are included to capture the availability of and/or access to amenities (basic goods & services, entertainment, recreation) and variations in local costs of living. Locational factors may yield a variety of expected or unexpected effects in hedonic models. In general, it is assumed that teachers prefer to work in areas where they have access to amenities, like culture, entertainment and arts in larger metropolitan areas or recreation in national parks. As such, teachers of similar quality will work for lower wages in areas closer to such amenities. The current WCLI is used to indicate the cost of living in the district, as this is a key factor teachers consider in deciding whether to accept a particular wage level. Table 3 shows the variables used.

Table 3
Discretionary and Uncontrollable Factors Influencing Wages

Discretionary Factors	Uncontrollable Conditions
Teacher Degree Level*	*School/district Conditions*
Teacher Experience*	School Poverty
Teacher Assignment (Full Time Teacher)*	School LEP/ELL
Grade Level (Secondary/ Elementary)*	School Unduplicated At Risk Count*
Teacher Race*	School Mobility Share*
Teacher Gender*	School Disability Share*
	WYCAS Outcomes (dropped)
	School Size (dropped)
	Class Size (dropped)
	District Average Additional Earnings Opportunities*
	Geographic/Location Measures
	Area Density*
	Distance to Yellowstone*
	Distance to 15k City*
	Distance to 50k City*
	Regional Costs of Living (WCLI)*
	or Median Housing Unit value (Census 2000) (dropped)

*Final model variables

Findings: Cross Sectional Variation in Wyoming Wages

Table 4 presents the results of 4 alternative regression models of base salaries for full time teachers in Wyoming. Initially a logged specification was applied, but model fit was comparable whether base salaries were logged (natural logarithm) or not. OLS (Ordinary Least Squares) models treat variations in salaries within teachers over time, and across teachers and districts as the same. Random effects models average the differences in salaries associated with each independent variable within teachers over time and across teachers. In OLS and random effects models, robust standard errors are applied, clustering teachers into districts, the organizational unit at which salary schedules are determined. That is, variations in salaries among teachers within the same district are not independent of one another.

Between effects model sort out specifically the differences in salaries across teachers (but not within teachers over time) associated with each independent variable. A good example of how these models vary can be seen in the coefficient estimates on whether a teacher holds a masters degree or not. The OLS specification indicates that on average, when a teacher has a masters' degree **or** obtains one from one year to the next, compared with teachers who do not hold a masters degree **or** compared to when the same teacher did not hold a masters degree, the degree is worth approximately $4,500 per year in base salary. When within teacher changes in degree status and between teacher effects of holding a masters degree are averaged in the random effects model, a masters degree is worth approximately $3,700 per year. However, when considering only that variation that exists between teachers for those with and without masters' degrees, the average variation in base salary is $4,793 per year.

A wage index that differentiates costs of comparable teachers across districts should focus on between teacher and between district effects. When locational and work condition factors are added, the between teacher variance explained increases to only 80 percent. As one might expect, the standard components of the single salary schedule – years of experience and education – drive the vast majority of wage differences among Wyoming teachers. When degree level and experience are removed from the model, only about 3 percent to 5 percent of between teacher variance in salary is explained.

Despite the relatively weak explanatory power of locational and work condition factors, several are highly significant predictors of salary variation which are then important factors to address when adjusting wages across districts. In the between effects model, teachers in schools with more children with disabilities commanded higher salaries. In contrast with expectations, districts with higher unduplicated at risk shares show lower, though statistically non-significant salaries. Notably, Wyoming does not, like many other states, have high poverty larger urban centers that would require more significant combat pay. Also, teachers in districts able to provide more supplemental earnings opportunities made slightly lower base salaries ($1 increase in supplemental salary associated with a 35 cent reduction in base salary).

In keeping with the logic of locational factors, the further a school is from a larger metropolitan area, the higher the salary demanded. For each additional mile of distance from a city of 50,000 or more, base salary is $13.69 higher. Distance to Yellowstone appears to exert the

Table 4
Regression Model Estimates

	OLS		Random Effects		Between Effects		Between Effects	
	Estimate	*R.S.E*	*Estimate*	*S.E.*	*Estimate*	*S.E.*	*Estimate*	*S.E.*
Education Level								
Masters	4528.87	498.84 *	3726.23	96.95 *	4792.96	119.62 *	4876.12	120.41 *
Doctorate	1938.49	1414.21	2527.22	1243.61 *	1741.97	1194.69	1923.60	1210.00
Total Experience								
0 to 5 Years	-3915.76	272.51 *	-3372.92	131.12 *	-4179.73	197.64 *	-4059.98	197.69 *
11 to 15 Years	4030.02	163.53 *	3876.88	131.32 *	4013.24	192.88 *	4054.32	194.08 *
16 to 20 Years	7123.05	297.59 *	7085.05	149.43 *	7045.93	196.85 *	7115.51	197.87 *
Over 20 Years	10326.78	563.72 *	10171.70	133.80 *	10277.67	158.07 *	10287.92	158.83 *
Contract Days	223.49	50.64 *	234.10	20.64 *	225.50	20.85 *	241.84	26.23 *
Secondary Teacher	13.73	158.19	41.48	127.00	26.42	126.24	156.75	127.31
School Characteristics								
Percent Unduplicated At Risk	-254.80	809.71	-412.01	353.75	-133.54	367.67	-52.86	389.93
Percent Special Education	6152.79	2297.07 *	4999.28	1100.92 *	6144.49	1126.08 *	2314.62	1212.65
Percent Mobility	-30.02	41.07	-55.33	32.09	-23.94	32.34	15.72	33.66
School District Geography								
Individual District Characteristics								
10 Mile Density	16.84	4.31 *	15.20	1.43 *	16.76	1.44 *		
Distance to 15k City	-0.65	7.00	-2.43	1.61	-0.85	1.58		
Distance to 50k City	13.26	4.86 *	10.82	1.75 *	13.69	1.74 *		
Distance to Yellowstone	-6.93	3.13 *	-7.45	0.89 *	-6.96	0.87 *		
WCLI	121.95	24.61 *	121.09	9.12 *	123.58	8.88 *		
District Average Supplemental Salary	-0.35	0.50	-0.42	0.14 *	-0.35	0.13 *	-1.05	0.15 *
CBSA Dummy Variable (Comparison = Non-CBSA)								
Casper (16220)							1988.47	189.15 *
Cheyenne (16940)							1723.09	179.28 *
Evanston (21740)							537.36	259.25 *
Gillette (23940)							1609.81	211.33 *
Jackson (27220)							6350.50	377.61 *
Laramie (29660)							-327.01	302.84
Riverton (40180)							-534.76	273.13
Rock Springs (40540)							2530.89	225.10 *
Sheridan (43260)							3502.76	320.66 *
Teacher Race/Ethnicity								
Black	-657.51	758.13	-353.41	915.82	-525.17	875.89	-701.60	887.98
Hispanic	373.56	428.14	343.18	460.93	371.75	442.26	387.76	444.92
Indiginous	365.81	701.68	174.53	634.15	362.34	610.50	897.44	624.62
Gender	101.67	125.14	141.13	129.51	76.11	124.78	29.06	125.43
Year	1214.88	230.77 *						
Constant	-19489.63	10234.55	-19583.33	4048.60 *	-19460.68	4076.34 *	-8995.57	4825.60
R-Squared								
Within			0.14		0.15		0.14	
Between			0.80		0.80		0.80	
Overall	0.79		0.78		0.78		0.78	

*p<.05
Robust Standard Errors estimated with clustering at district level.

opposite effect, possibly picking up some of the effect of the very high WCLI and resultant wages of districts immediately adjacent to Yellowstone.

The WCLI itself has a strong positive effect on current wage variation. It indicates that districts with a higher cost of living must provide higher salaries to compensate for this disamenity. Its role is not as strong as it is in the current Wyoming school finance model, where it is the only factor accounting for cost differences across districts.

The final model in Table 4 replaces all locational factors (including the current WCLI) with dummy variables indicating the core based statistical area in which a district lies. CBSA

fixed effect coefficients are compared against the average base salary of teachers in non-CBSA (rural) districts, the largest group of Wyoming teachers. Recall from Table 3 that the 3-year average base salary of Wyoming rural teachers was about $39,650. The CBSA dummy variable model indicates that salaries in Casper (+$1,988), Cheyenne (+$1,723), Jackson (+$6,350), Rock Springs (+$2,530) and Sheridan (+$3,503) were statistically significantly higher than rural salaries for teachers of comparable degree level and experience, in schools of comparable work conditions. Salaries in Riverton were lower than in rural areas.

The final model is revealing in a number of ways, but of questionable value for establishing a CBSA-based wage index. First, it could be that the CBSA dummy variable model picks up primarily the effects of the current WCLI and the effects of local economic conditions more so than it should, while not compensating appropriately more remote rural districts. Only Riverton falls below rural districts in wage estimates, yet other hedonic wage indices provide somewhat higher values to some Riverton area districts that appear to have more difficult student populations.

Second, when the current WCLI is included in the CBSA fixed effect model coefficients change in dramatic and revealing ways. This is true for Jackson. Without the WCLI in the model, Jackson shows a $6,000 increase in salary, or about 15 percent above rural districts. Note that Jackson's WCLI is actually 40 percent above the average (1.0) WCLI and more than 50 percent above the lowest WCLI. When accounting for the WCLI, Jackson shows a wage lower than rural districts by more than $4,000. One might infer from these findings that schools in Jackson are diverting a substantial portion of the funding boost they receive for costs of living to functions other than salary.

Table 5 includes recent values of the WCLI along side indices generated from the predicted values in Table 4. The average of the 48 WCLI values is approximately 96, while the average of the between effects index is 100. More significant, however, are the differences in range of cost index. The WCLI ranges from 87.7 to as high as 140. This is well beyond the range of any hedonic index estimated, including those reported herein. In the between effects model, values range from 93 to 118. One implication of this finding is that districts currently receiving WCLI values of less than 93 are diverting additional resources to salaries to remain competitive and Jackson in particular, is diverting a significant share of the benefits of its very high WCLI to functions and objects other than full time instructional teacher base salaries.

Table 5
Indices Derived from Predicted Wages Compared with WCLI

District Number	District Name	WCLI	Godby Index 8	OLS	Random Effects	Between Effects
101000	Albany #1	102.50	98.7	98.37	98.48	1.01
201000	Big Horn #1	90.50	95.7	95.48	95.34	0.98
202000	Big Horn #2	90.50	95	96.90	97.17	1.00
203000	Big Horn #3	90.50	98.3	96.72	96.36	0.99
204000	Big Horn #4	90.50	98.7	96.42	96.10	0.99
301000	Campbell #1	104.00	105.2	103.20	103.25	1.06
401000	Carbon #1	94.80	100.8	97.86	97.54	1.01
402000	Carbon #2	94.80	98.2	95.73	95.34	0.98
501000	Converse #1	92.30	97.1	93.28	93.64	0.96
502000	Converse #2	92.30	96.9	92.04	92.77	0.94
601000	Crook #1	89.90	96.2	94.47	94.43	0.97
701000	Fremont # 1	94.70	100.7	99.93	99.61	1.03
702000	Fremont # 2	94.70	97.2	99.09	98.35	1.02
706000	Fremont # 6	94.70	98.6	97.69	97.14	1.00
714000	Fremont #14	94.70	98.6	100.63	99.89	1.04
721000	Fremont #21	94.70	99.3	99.92	99.98	1.03
724000	Fremont #24	94.70	98.4	96.01	95.83	0.99
725000	Fremont #25	94.70	101	97.59	97.69	1.00
738000	Fremont #38	94.70	99.2	99.43	99.55	1.02
801000	Goshen #1	90.30	98.6	92.25	91.94	0.95
901000	Hot Springs #1	92.30	100	97.78	97.34	1.00
1001000	Johnson #1	103.00	103.4	99.57	99.49	1.02
1101000	Laramie #1	104.00	105.4	102.97	102.98	1.06
1102000	Laramie #2	104.00	95.6	92.17	92.44	0.95
1201000	Lincoln #1	92.20	99.6	94.91	95.07	0.97
1202000	Lincoln #2	92.20	98	95.92	95.76	0.98
1301000	Natrona #1	97.80	107.9	102.96	103.22	1.06
1401000	Niobrara #1	87.70	94.6	91.92	91.64	0.94
1501000	Park # 1	97.80	96.4	100.38	100.54	1.03
1506000	Park # 6	97.80	97.4	101.33	101.39	1.04
1516000	Park #16	97.80	95.6	97.99	98.00	1.01
1601000	Platte #1	91.00	98.9	92.79	92.95	0.95
1602000	Platte #2	91.00	98.4	90.25	90.39	0.93
1701000	Sheridan #1	104.20	102.1	95.25	95.22	0.98
1702000	Sheridan #2	104.10	107.2	103.50	103.61	1.07
1703000	Sheridan #3	104.20	103.2	96.53	96.44	0.99
1801000	Sublette #1	104.80	99.7	102.90	102.71	1.06
1809000	Sublette #9	104.80	99.6	100.50	100.12	1.03
1901000	Sweetwater #1	97.70	108.2	102.39	102.20	1.05
1902000	Sweetwater #2	97.70	105.6	100.65	100.52	1.04
2001000	Teton #1	140.00	118.2	114.45	114.46	1.18
2101000	Uinta #1	95.20	102.5	96.15	96.09	0.99
2104000	Uinta #4	95.20	102.3	96.11	96.01	0.99
2106000	Uinta #6	95.20	102.6	97.07	96.99	1.00
2201000	Washakie #1	89.80	100.6	97.86	97.28	1.01
2202000	Washakie #2	89.80	100.5	93.57	94.00	0.96
2301000	Weston #1	88.20	92.3	92.14	92.11	0.94
2307000	Weston #7	88.20	93.9	91.31	90.95	0.94

The indices in the last column are slightly different from those in the October 20, 2005 version of the report because that version normed the index on the median teacher; the indices are now normed on the median district.

Re-estimation excluding Teton #1

Given concerns expressed by the Committee that Teton #1 represents a potential outlier in the analyses in the previous sections, and possible could produce undue influence on all other indices, an additional series of models were estimated and index values predicted excluding Teton #1.

Table 6 compares the model coefficients including and excluding Teton #1. Models explain nearly the same amounts of variance in both within and between district base salaries. Changes to coefficient magnitude and significance are not large.

Table 6
Comparison of Between Effects Models with and Without (Final) Teton #1

	Final (excl. Teton)			**Preliminary**		
	Estimate	*R.S.E*		*Estimate*	*S.E.*	
Education Level						
Masters	4819.13	120.21	*	4792.96	119.62	*
Doctorate	1729.31	1190.48		1741.97	1194.69	
Total Experience						
0 to 5 Years	-4192.75	199.09	*	-4179.73	197.64	*
11 to 15 Years	3987.36	193.66	*	4013.24	192.88	*
16 to 20 Years	7010.60	197.85	*	7045.93	196.85	*
Over 20 Years	10234.87	158.85	*	10277.67	158.07	*
Contract Days	217.99	22.09	*	225.50	20.85	*
Secondary Teacher	33.24	127.02		26.42	126.24	
School Characteristics						
Percent Unduplicated At Risk	-126.01	367.31		-133.54	367.67	
Percent Special Education	6166.81	1133.46	*	6144.49	1126.08	*
Percent Mobility	-20.53	32.29		-23.94	32.34	
School District Geography						
Individual District Characteristics						
10 Mile Density	17.31	1.50	*	16.76	1.44	*
Distance to 15k City	-1.56	1.71		-0.85	1.58	
Distance to 50k City	14.47	1.82	*	13.69	1.74	*
Distance to Yellowstone	-6.85	0.87	*	-6.96	0.87	*
WCLI	107.86	17.36	*	123.58	8.88	*
District Average Supplemental Salary	-0.37	0.14	*	-0.35	0.13	*
Teacher Race/Ethnicity						
Black	-557.10	872.87		-525.17	875.89	
Hispanic	365.31	440.70		371.75	442.26	
Indigenous	347.25	608.48		362.34	610.50	
Gender	107.82	125.52		76.11	124.78	
Constant	-16634.88	4936.33	*	-19460.68	4076.34	*
R-Squared						
Within	0.14			0.15		
Between	0.80			0.80		
Overall	0.78			0.78		

Table 7 provides the between effects Hedonic Index for the analysis excluding Teton; in the simulation option using these indices, the WCLI of 140 has been entered for Teton.

Table 7
Indices Derived from Predicted Wages, Excluding Teton County

District Number	District Name	Between Effects
101000	Albany #1	1.01
201000	Big Horn #1	0.98
202000	Big Horn #2	1.00
203000	Big Horn #3	1.00
204000	Big Horn #4	0.99
301000	Campbell #1	1.06
401000	Carbon #1	1.01
402000	Carbon #2	0.99
501000	Converse #1	0.96
502000	Converse #2	0.95
601000	Crook #1	0.97
701000	Fremont # 1	1.03
702000	Fremont # 2	1.02
706000	Fremont # 6	1.01
714000	Fremont #14	1.04
721000	Fremont #21	1.03
724000	Fremont #24	0.99
725000	Fremont #25	1.01
738000	Fremont #38	1.03
801000	Goshen #1	0.95
901000	Hot Springs #1	1.01
1001000	Johnson #1	1.02
1101000	Laramie #1	1.06
1102000	Laramie #2	0.94
1201000	Lincoln #1	0.98
1202000	Lincoln #2	0.99
1301000	Natrona #1	1.06
1401000	Niobrara #1	0.95
1501000	Park # 1	1.03
1506000	Park # 6	1.04
1516000	Park #16	1.01
1601000	Platte #1	0.96
1602000	Platte #2	0.93
1701000	Sheridan #1	0.98
1702000	Sheridan #2	1.07
1703000	Sheridan #3	0.99
1801000	Sublette #1	1.06
1809000	Sublette #9	1.03
1901000	Sweetwater #1	1.06
1902000	Sweetwater #2	1.04
2001000	Teton #1	
2101000	Uinta #1	0.99
2104000	Uinta #4	0.99
2106000	Uinta #6	1.00
2201000	Washakie #1	1.01
2202000	Washakie #2	0.97
2301000	Weston #1	0.95
2307000	Weston #7	0.94

Comparisons Across Indices

Table 8 provides correlation values between the indices reported in Table 5 and one index reported by Godby in his 2003 report. Note that correlations speak only to the rank order of districts for one index versus another. The correlations do not speak to the striking differences in the overall range, from top to bottom, of index values. Another important consideration is that while this report and Godby both present hedonic indices, Godby models supplemental pay including administrative stipends as part of his dependent measure of salary where the current analysis focuses specifically on base salaries. In addition, while Godby used a single year of approximately 7,000 cases, the analyses reported here used 2 years (3 in preliminary models), of matched teachers over time including just under 4,000 cases per year of only full time teachers working in a relatively narrow range of annual contract days. Godby includes all teachers working 50 percent time or more.

Table 8 shows first that the WCLI is relatively highly related to both indices estimated herein (over 0 .75) and Godby's index. That is, those who currently receive a higher WCLI are likely to receive a higher hedonic index. Just not nearly as much higher. Further, the indices estimated herein are relatively highly correlated with Godby's Index 8 from his 2003 report.

Table 8
Correlations Across Indices

	WCLI	*Godby Index 8*	*OLS*	*Random Effects*	*Between Effects*
WCLI	1.000				
Godby Index 8	0.735	1.000			
OLS	0.765	0.756	1.000		
Random Effects	0.776	0.764	0.998	1.000	
Between Effects	0.762	0.754	1.000	0.997	1.000

Figure 2 shows, most importantly, that while the WCLI ranges (along the horizontal, X axis) from under 88 percent to 140 percent, all hedonic indices, including those estimated herein and the Godby index included in the figure, range from the low to mid 90s to under 120.

Figure 2
Comparison of WCLI to Hedonic Indices

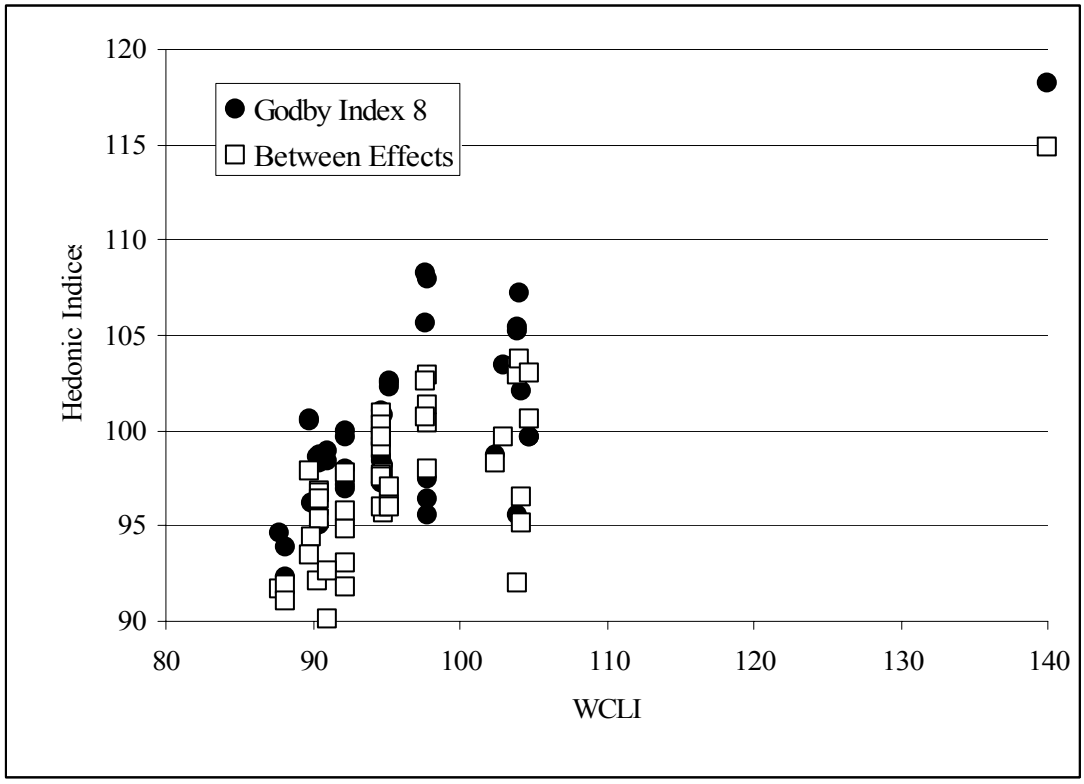

Figure 3 addresses the geographic distribution of the WCLI versus the hedonic wage index estimated herein. An important consideration is the abruptness of changes in index values among adjacent districts because such changes may influence teacher decisions regarding where to seek employment without requiring that the teacher uproot and move. For example, the current WCLI provides Teton County schools the opportunity to pay nearly 50 percent higher wages than Lincoln County. In contrast, the Hedonic index provides for about a 19 percent difference in wage. In other parts of the state, Cheyenne appears to pick up a disproportionate positive effect on its hedonic wage index relative to its rural neighbors to the north and east. That said, this effect is comparable to the differences that exist in the current WCLI.

Figure 3

Geographic Distribution of the WCLI versus the Hedonic Model

Conclusions & Recommendations

The paper concludes that Wyoming would provide a more appropriate cost-based adjustment for regional cost differences by using the between effects Hedonic Index presented in the last column of Table 6 for the following major reasons:

- The hedonic index approach, even when imperfectly estimated, best accommodates districts' abilities to recruit and retain teachers of comparable qualifications.

- The hedonic approach is the only approach to consider directly, the district level working and living conditions that so strongly influence teachers' choices of where to seek employment and whether they will choose to stay.

- The hedonic approach most directly supports equity and adequacy objectives of cost-based school aid formulas by focusing on providing teachers of equitable and adequate quality to students in schools. In contract, cost of living indices focus on equity for teachers rather than students, and most often support unequal lifestyles for teachers.

- The hedonic approach was the recommended approach by the National Academy of Sciences, National Research Council, Committee on Education Finance, Commission on Social Sciences and Education. In addition, the hedonic approach was the preferred approach of the National Center for Education Statistics in the 1990s.[39]

[39] The more recent shift to a comparable wage index by NCES is a function of data availability and not necessarily a shift in preference away from the hedonic approach.

Appendix F

ESTIMATION OF SALARY LEVELS FOR THE WYOMING SCHOOL FINANCE MODEL

By Michael Wolkoff

Introduction

In *Campbell County School District vs. State of Wyoming (Feb 23, 2001)* the Court opined that "teacher salaries, as computed by the MAP model and as driven by class size, are reasonable as supported by the record," "but, suffice it to say, if teacher salaries are not adequately adjusted for inflation in keeping with our holding on the external cost adjustment, they will no longer be constitutionally cost-based." Thus, the Court acknowledged that the compensation levels established by the 1997 school finance reforms had been adequate but that further benchmarking was required to establish current adequacy.

In a report to the legislature, dated January 31, 2002, ("Wyoming School District Employee Compensation Report") Michael Wolkoff and Michael Podgursky concluded that teacher pay in Wyoming was adequate to attract and retain a qualified workforce and recommended a compensation package to maintain the ability of Wyoming's school districts to continue functioning effectively in the teacher labor market. Over four years have elapsed since the Wolkoff and Podgursky study was conducted, and the Campbell ruling requires a new assessment as to whether teacher salaries are adequate. This report updates the earlier study using the most recent data available.

1. Teacher Compensation

Following the Wyoming Supreme Court decision, current teacher compensation was benchmarked by comparing changes in Wyoming teacher pay to changes in various price and wage indices. First, the rate of growth of compensation for teachers at specific locations within the salary schedule was examined. Second, changes in the compensation teachers receive as they move through the salary schedule were compared to the inflation and wage growth benchmarks.

The ability of Wyoming to attract and retain teachers will also depend on how well teachers are paid elsewhere. This comparison is made in multiple ways, first by referring to American Federation of Teacher survey data that reports the state ranking of average pay for teachers, most recently for the 2003-2004 school year. The AFT data establish Wyoming's ranking relative to all other states. But, teacher labor markets are for the most part regional. Consequently, a more accurate representation of the competitiveness of Wyoming's teacher compensation is to compare it with compensation in Colorado, Idaho, Utah, Nebraska, Montana, and South Dakota, by analyzing the published salary schedules of school districts within each state. The comparisons are based on the latest data available - the published salary schedules for the 2003-2004 and 2004-2005 academic years. Salary schedule data make it possible to compare teachers by examining compensation for identical placements within the salary schedule.

Since the publication of the 2002 report, the findings have been viewed critically by those who argue that the Campbell Court requires that Wyoming teacher salaries be competitive not only at the regional level, but also nationally. Despite the Court's language, considerable consensus has formed among scholars who study teacher labor markets that the labor market for teachers is regional, and not national. Nevertheless, this study also examined what Census data are available to determine to what extent teacher migration is a significant factor in teacher labor

markets in other states.

2. Employee Compensation Recommendations

Using econometric methods, employee pay is analyzed and recommendations are made for financing employee compensation for the job categories that fill the recalibration prototypes, with suitable adjustments for experience, education, and responsibility as requested by the Campbell Court.

Growth in Wyoming Teacher Pay

The Wyoming Supreme Court specifically directed that the continued competitiveness of the Wyoming teacher pay structure be established through a comparison with rates of general price inflation and growth rates of compensation of other workers in the labor market. Figure 1 compares salary growth for four points in the teacher salary schedule from academic years 2000-2001 to 2003-04 and 2004-05 with four measures of inflation or wage growth in the economy. The comparison benchmarks consist of the national Consumer Price Index (U.S. Bureau of Labor Statistics), the Wyoming Cost of Living Index (Wyoming Bureau of Economic Analysis), the average change in weekly wages for all Wyoming industries (U.S. Bureau of Labor Statistics), and the Employment Cost Index for white collar workers (U.S. Bureau of Labor Statistics).[40] For this three and four year period, cumulative salary growth for beginning teachers with BA's or Master's degrees ranged from at least 60 percent higher to nearly 3 times the cumulative growth in the comparison inflation indices of the WCLI, the US CPI, WY all industry wages, and the Employment Cost Index. These findings are in vivid contrast to our findings in our previous report where we found only experienced teacher pay growth to exceed the comparison indices.

The CPI and WCLI comparisons provide information as to whether the real standard of living of Wyoming teachers has improved over this time period. The Wyoming all industry wage and Employment Cost Index comparisons summarize teacher pay relative to alternative occupations for which data are available statewide in Wyoming and nationally. Although Wyoming teachers fare somewhat less well against the locally calculated price index (WCLI) than they do against the national CPI, the WCLI comparison is probably an underestimate of living condition improvements because of the failure of the WCLI to incorporate quality enhancements in its calculations. In any event, the real standard of living of Wyoming teachers has improved under either metric.

Looking at national data we find that the CPI has increased 6.6 percent from June 2000, just before the start of the 2000-01 academic year, through June 2003. The price index increased an additional 3.4 percent in the subsequent year for a total growth of 10 percent by June 2004.

[40] Data for the Wyoming manufacturing wage begins in 2001 so computed rates of growth are calculated for a shorter time period.

The WCLI experienced a 15.4 percent growth from the value in June 2000 as of June 2004. In comparison, the average starting wage in Wyoming, for a teacher with a BA, increased 20.4 percent from the start of the 2000-01 contract to the 2003-04 contract and 25.6 percent to the 2004-05 contract. The corresponding increase for teachers with Master's degrees was 19.4 percent and 24.4 percent respectively.

Teacher wages also increased more than the increase in average hourly wage in Wyoming. Although this is a broad classification it does summarize the employment experience of Wyoming residents. Finally, during this same time period, white collar workers nationally did not enjoy the same rate of pay increase as Wyoming teachers as indicated by the change in the national Employment Cost Index.

These comparisons of average teacher pay understate the actual salary increases that Wyoming's teachers enjoyed over this time period because they fail to make provision for the experience pay teachers receive as they move through the salary schedule.[41] Figure 1 rectifies this shortcoming by also including a provision for a three-step move through the salary schedule by AY 2004 and a four-step move for AY 2005. Each case represents what would happen to a representative teacher in each experience pay class who was hired in AY 2001. The inclusion of the three-step experience move greatly increases the growth in compensation for Wyoming teachers. The actual average wage experience of a starting teacher was a nominal salary increase of 30.3 percent three years later, and 38.8 percent by the fourth year. The corresponding percentage increase for a beginning teacher with a Master's degree was 28.2 percent and 36 percent respectively. When experience credit is included, the cumulative increase in salaries experienced by teachers is approximately triple the increase in the national cost of living increase in percentage terms. Teachers with bachelor's degree enjoy only slightly higher percentage salary increases than those with graduate degrees.

Wyoming Teacher Pay Relative to Comparison States

The American Federation of Teacher's salary survey ranked Wyoming's average teacher salary 36th nationally in 2003-04.[42] This represents a significant change from the 1999-2000 ranking of 42nd, referenced in our previous report. While Wyoming ranks below the median on national comparisons, its average pay is not out of line with surrounding states. Average teacher salaries position Colorado (21), Idaho (32), Utah (38), Nebraska (35), Montana (45) and South Dakota (50) in 2003-04. Although there is some criticism of the methodology used to collect these data and the accuracy of the survey results, we include these findings as they have been referenced in the policy debate.

Methodological issues aside, the simple comparison of average teacher salaries used by the AFT may be misleading because average salary differences may reflect differences in the

[41] Actually, these comparisons slightly understate the increase for teachers when compared to Wyoming wage growth and the US ECI because both of these broader measures reflect experience growth in the workforce which is assumed to be zero for a fixed position in the teacher salary schedule. On the other hand, a comparison which moves teachers through the salary schedule is overstated, because the assumed 3 and 4 step movement through the teacher salary schedule far exceeds the implicit experience growth contained in the comparison measures.

[42] See the AFT web site for a complete listing of state salary rankings: http://www.aft.org/research/survey/tables/tableI-1.html

characteristics of the workforce. For example, higher Idaho wages may reflect an older and better-educated workforce, rather than a more generous salary schedule. A more accurate comparison would compare the wages of comparable teachers. The AFT makes this comparison for average beginning salaries in 2003-04. They find the following rankings: Colorado (19), Idaho (44), Utah (42), Montana (49), South Dakota (50) and Wyoming (29). This also represents a considerable improvement in the relative Wyoming rank. AFT also makes a comparison by making some adjustment for seniority of the workforce. While this comparison is probably best viewed as suggestive, based on 2001-02 data, they find Wyoming teacher experience to be approximately one year greater than the national average, thereby dropping Wyoming two places in the experience adjusted salary ranking. The AFT also attempts to compare teachers after controlling for the cost-of-living in each state. These comparisons are undoubtedly imperfect, as no reliable interstate cost of living index has been created. However, they do provide a context for comparing "real" compensation. They find Wyoming to rank 34th on this measure in 2001-02. The other comparison states rank: Colorado (37), Idaho (25), Utah (29), Montana (46), and South Dakota (49). Finally, AFT compares average teacher wages to the average annual earnings in the private sector. Here, using the more recent 2003-04 data, they report the following average teacher pay to average private sector earnings ratios: Colorado (1.08), Idaho (1.36), Utah (1.23), Montana (1.40), South Dakota (1.20) and Wyoming (1.36). Wyoming is tied for second best on this measure within the region. To the extent that within state opportunity costs are most relevant, this finding may be the most telling.

While the AFT data provide a useful starting point, the most recent survey is two years old. More recent data are available which can speak to Wyoming's current competitiveness. A highly detailed analysis of published teacher salary schedules was conducted to make further comparisons of Wyoming teacher salaries within its reference grouping of teachers in Colorado, Idaho, Utah, Nebraska, Montana, and South Dakota. By analyzing the published salary schedules of school districts within each state these data allows us to examine teachers' pay at different points in the salary schedule.

To do this, a statewide average for each cell in the schedule was constructed by weighting each school district's cell value by the FTE count or enrollment count for all school districts within a state. The states differ considerably in the number of school districts within the state, ranging from 40 districts in Idaho to over 300 in Nebraska and Montana. Wyoming, with 48 districts, reports data from all school districts in both 2003-04 and 2004-05. Data reporting is not quite universal in the other states (Montana and Nebraska with so many small districts have fewer districts reporting than the other states), but the districts that fail to report their pay schedules account for relatively few of the teachers within the state and their exclusion has little impact on the calculation of state averages.

This detailed analysis goes beyond other available salary comparisons. The AFT data are limited to either the average statewide salary for all teachers, or beginning teacher salaries, or various ad-hoc adjustments. Since not all teachers are average, nor are all teachers paid a starting teacher's wage, the AFT data are limited in their ability to summarize the competitiveness of a state's compensation system. Examining multiple points in the salary schedule gives a much clearer indication of how well or poorly Wyoming teachers are paid. This methodology also allows a calculation of the actual compensation increases enjoyed by teachers moving through

the salary schedule. This provides a much more accurate picture of compensation changes than does a comparison of fixed points on the salary schedule (although the later is useful for analyzing the attractiveness of the systems to new entrants).

Figures 2 and 3 provide a look at relative teacher salaries for the 2003-04 and 2004-05 Academic Years. The figures examine five points in the salary schedule: starting teachers with either a BA or Master's degree, teachers with BA's or Master's degrees with three and four years experience, and teachers earning at the schedule maximum salary. Both figures reveal that the salary structure appears quite similar in each of the seven states, as the relative within-state pay of different experience/education combinations is quite similar. Figures 4 and 5 display these same data in a manner that allow clearer comparisons of other states to Wyoming. Here, each of the state's salary schedule categories is calculated as a percentage of the Wyoming level. From this figure we can see that in 2003-04 and 2004-05 Wyoming salaries generally exceeded all states with the exception of Colorado. This is a marked change from the 2002 study at which point Wyoming salaries also trailed Utah, Nebraska, and most significantly, Colorado. Although Wyoming still trails Colorado, it has closed the gap in teacher salaries for all categories other than the average maximum scheduled salary.

For Wyoming to have changed its position in the regional rankings and to have closed the gap with Colorado requires that Wyoming teachers would have enjoyed relatively more generous pay increases since the last recalibration report. This can be seen in Figures 6 and 7 which compare the rate of pay increase for Wyoming school teachers relative to teachers in comparison states. In Figures 8 and 9**,** we have standardized each state's situation relative to Wyoming's choices. Thus, a state that awarded the same percentage increase in teacher salaries as Wyoming, from AY 2002 to AY 2004 or AY2005, would be at the 100 percent level. More generous increases would exceed the 100 percent level that is pegged to Wyoming. One clear conclusion can be drawn from these graphs: Wyoming salary increases in this period have exceeded the increases awarded in any of the regionally competitive states.

The Regional Market for Teachers[43]

Education research consistently finds that teacher labor markets are local in character. That is to say, most teachers restrict their job search to the local or regional labor market. This holds for new as well as experienced teachers. Boyd, Lankford, Loeb, and Wyckoff (2003) for example, find that 85 percent of New York teachers take their first teaching job within 40 miles of their home town.[44] Similar high rates occur outside of NYC as well. An earlier study of national longitudinal data on recent college graduates found that over eighty percent of college graduates who become teachers take jobs in the state in which they graduated from college

[43] *This section was contributed by Dr. Michael J. Podgursky, University of Missouri, Columbia.*

[44] Boyd, Donald, Hamilton Lankford, Susanna Loeb, James Wyckoff. 2003. "The Draw of Home: How Teachers' Preferences for Proximity Disadvantage Urban Schools." State University of New York at Albany, (December).

(Ballou and Podgursky, 1997).[45] Data for Missouri show that large shares of the teaching workforce come from the nearest teacher training programs, which, in turn, are generally housed in four year colleges that tend to attract students from the same or contiguous counties.[46]

This does not mean that teachers never leave the state in which they are born. In fact, many teachers do move from one part of the country to another. However, this largely reflects that fact that teachers, roughly eighty percent of whom are women, are often "tied movers." This means that the relocation decision is driven primarily by the husband's rather than the wife's employment prospects. The fact some teachers are observed moving from Wyoming to New York, or vice versa, does not mean that there is a national market for teachers. In fact, there is very little evidence that teachers move from one state to another in response to salary differences.

Some evidence on these points can be gleaned from the Public Use Microdata Sample (PUMS) of the 2000 Census of Population. In the 2000 Census, respondents are asked two questions that provide mobility information. First, respondents are asked the county and state in which they resided five years earlier. Second, they are asked the state in which they were born. An analysis of these data for full-time, Wyoming public school teachers, aged 25-64, provides insight into the regional labor market question

Figure 10 shows the migration patterns over five years for teachers in Wyoming, the six contiguous states to Wyoming, and the rest of the nation. This figure looks at the world from the perspective of Wyoming. The first histogram bar for each state displays the number of teacher "imports." A teacher is an "import" if she lived in a state other than Wyoming five years earlier. The next bar is "exports." A teacher is an "export" if she is a full time teacher in another state but lived in Wyoming five years earlier. For convenience we treat exports as a negative number. Finally, we report net imports (imports + exports).

Figure 10 shows that Wyoming runs modest surpluses or deficits with each of the surrounding states. However, these differentials are very small in magnitude. Further, these flows are accumulated over five years, as a teacher could have moved in any one of the years prior to when she lived in the origin state. Thus, on an annual basis, imports and exports are very small relative to a Wyoming teaching workforce of roughly 7200 teachers. For example, while Wyoming on net did lose teachers to Colorado, the annual flow rate was only 46 teachers (i.e., 232/5). Considering all the contiguous states, Wyoming ran a small surplus (66 teachers). Most of the teacher mobility in and out of Wyoming was restricted to the contiguous states.

In order to assess the mobility of recent college graduates, in Figure 11 the analysis is restricted to teachers aged 25 or younger. Five years earlier most of these teachers would have been in college. The vast majority of these young teachers were in Wyoming (206) or in a contiguous state (131) during these college-age years. Only 46 migrated from a non-contiguous

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[45] Ballou, Dale and Michael Podgursky. 2003. Teacher Pay and Teacher Quality. Kalamazoo, Michigan: W.E. Upjohn Institute for Employment Research.

[46] See "Teacher Preparation Institution Profiles"
http://dese.mo.gov/divteachqual/teached/teacherprepprof/index.html

state. A further indication of the regional character of the teacher labor markets is seen in Figure 12. Here we consider the place of birth of these same young teachers. The vast majority (85 percent) were born in WY or a contiguous state.

In summary, the pattern of teacher mobility in Wyoming points clearly to the fact that few of Wyoming's teachers elect to move. To the extent that mobility is present, outward mobility is almost perfectly balanced by the movement of teachers into the state. For the relatively small numbers of teachers that do cross state lines, the majority of such teacher moves are accounted for by movement to contiguous states. Thus, the most relevant salary comparisons are for salaries offered within a state, and salaries offered in nearby states.

3. Employee Compensation Recommendations

Teacher Salaries

The Campbell Court required that the state finance formula recognize differences in teacher education and experience as factors in determining the funding level necessary to cover the cost of hiring teachers. This is done by making use of administrative data that provides an entire census of Wyoming classroom teachers (AY 2005) including teacher pay, experience and education. Since the basis of the funding model is to fund full-time positions based on the FTE levels provided in the prototypes, education and experience premiums are derived on the basis of full-time teaching staff.[47] Only teachers who are reported as receiving greater than $20,000 in AY 2005, are included in the analysis. Teacher base salary is regressed on prior total years experience less than 20, years experience greater than 20, whether the teacher holds a master's degree or higher, and a constant. The ordinary least square regression results indicate that the average statewide starting salary is $29,716. Each teacher holding a masters degree or higher is compensated $5,303 on average. Each year of experience up to 20 years is worth $728 in additional funding. Experience years above 20 are worth $159. The regression results are based on 7,023 teachers in the data set with usable data. All variables are highly statistically significant, and in total explain over 70 percent of the variation in salary levels across the state.

```
      Source |       SS       df       MS              Number of obs =    7023
-------------+------------------------------           F(  3,  7019) = 5567.85
       Model |  3.2241e+11     3  1.0747e+11           Prob > F      =  0.0000
    Residual |  1.3548e+11  7019  19301583.7           R-squared     =  0.7041
-------------+------------------------------           Adj R-squared =  0.7040
       Total |  4.5788e+11  7022    65206901           Root MSE      =  4393.4

------------------------------------------------------------------------------
  salary_use |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
total exper  |   727.9825   9.252665    78.68   0.000     709.8445    746.1205
total_exp>20 |  -568.6665    22.5695   -25.20   0.000    -612.9096   -524.4235
grad degree  |   5302.278   113.4678    46.73   0.000     5079.847    5524.709
constant     |   29716.03   110.9094   267.93   0.000     29498.61    29933.44
------------------------------------------------------------------------------
```

To implement these findings in the state funding model each school district receives funding based on the FTE allocation contained within the prototypes. Adjustments for experience and education are based on the average level of education and experience for all teachers working in the school district, weighted by their FTE assignment relative to the state average. Statewide, the average years of experience when we only count the first 20 years of experience is 12.35. There is an average of 2.24 years of experience beyond 20 years. The average percent of teachers with master's degrees or higher is 36.2 percent. School districts whose teachers have the average state characteristics would receive $40,982 for each allocated position.

[47] The teacher regression is restricted to those teachers with an assignment FTE greater than a .9.

Central Office Administrative Salary Adjustments

The Campbell Court also required that cost-based funding must recognize the level of responsibility, experience and education of central office administrative staff. This was done by using econometric techniques to investigate the relationship between education, responsibility, and experience to pay. The analysis distinguishes job responsibility by job title and size of student population (ADM) within the district.

The recalibration prototype allocates superintendents, assistant superintendents and business managers to each of the school districts. Currently, not all school districts make use of all of these positions. Only 17 Wyoming school districts currently have staffed the assistant superintendent position. These are typically school districts with enrollments larger than the state average, and which pay higher salaries than average. Because so few districts hire assistant superintendents, it is not possible to estimate reliably compensation parameters for this subgroup. As an alternative, the relationship between assistant superintendent compensation and superintendent compensation was separately investigated in those districts that have both types of employees. The pay of assistant superintendents was found to be 80 percent of the pay of superintendents on average.

To determine superintendent and business manager pay we make use of the 78 full-time assignment employees in those categories, state-wide. We estimate the value of experience, responsibility and education by regressing administrative salary on years of state experience, degree achieved, district enrollment, and an indicator variable identifying the employee's job title. With the exception of the experience variable, each of the variables is highly statistically significant. All of the point estimates are of reasonable magnitude and signed correctly. The estimating equation explains over 80 percent of the variation in central office, administrative supervisory salaries.

We recommend that each district be funded based on the district adjusted pay for superintendents, plus 80 percent of that pay for assistant superintendents, plus the district adjusted pay for business managers applied to the allocation of personnel defined in the prototypes. For the central office administrator with state-average characteristics, this translates into funding for a superintendent salary of $90,200, an assistant superintendent's salary of $72,160, and a business manager's salary of $58,302. District adjustments are based on the district, (fte assignment) weighted average deviation from the state average for each of the characteristics in the regression. Deviations of prior state experience from the state average should be funded at $300 per year, and ADM deviations at $4.64 per enrollment deviation. Educational adjustments provide an adjustment for the average degree attainment of centralized office administrators relative to the state average. Master's degree holders are funded at a $3,362 premium beyond the bachelors. The doctorate pays nearly an additional $500 beyond the masters.[48]

[48] For example, if 20.3% of a districts central administrators hold the doctorate degree, the district would be funded at (20.3% - 10.3%) * $15,306 = $1,531 higher for each allocated administrator, all else equal.

```
      Source |       SS       df       MS              Number of obs =      78
-------------+------------------------------           F(  6,    71) =   52.37
       Model |  3.0897e+10     6  5.1494e+09           Prob > F      =  0.0000
    Residual |  6.9814e+09    71  98330120.4           R-squared     =  0.8157
-------------+------------------------------           Adj R-squared =  0.8001
       Total |  3.7878e+10    77   491921955           Root MSE      =  9916.2

------------------------------------------------------------------------------
  salary_use |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    stateexp |   299.6839   192.2091     1.56   0.123    -83.57013     682.938
   bachelors |   11449.68   3766.373     3.04   0.003     3939.749    18959.62
     masters |   14812.28   4566.277     3.24   0.002     5707.384    23917.18
   doctorate |   15305.89   5742.419     2.67   0.010     3855.835    26755.95
districta~lk |   4.641834   .4547745    10.21   0.000     3.735039    5.548628
      busmgr |  -29043.89   3237.952    -8.97   0.000    -35500.18    -22587.6
       _cons |   66113.03   5030.107    13.14   0.000     56083.28    76142.78
------------------------------------------------------------------------------
```

School Level Administrative Salary Adjustments

The Campbell Court also required that cost-based funding must recognize the level of responsibility, experience and education of school based administrative staff. As was the case with central office administrators, this was done by using econometric techniques to investigate the relationship between education, responsibility, and experience to pay. The analysis distinguishes job responsibility by job title and size of student enrollment (ADM) within the district.

Principal and assistant principal pay is determined based on the 299 individuals who are assigned full-time to these pay categories across the state. Detailed data on the characteristics of these employees are used to calculate the relationship between school administrator education, experience and responsibility and pay. The regression analysis explains over 45 percent in the variation in school administrator pay. The determinants of pay are highly statistically significant and correctly signed.

We recommend that the model provide $55,442 in funding for the average assistant principal contained within the prototype, and $66,110 for the average principal in the prototype. Average funding would be adjusted in each district based on the actual, weighted average experience, education, and school enrollment patterns within the district. For each district's average enrollment above the statewide average of 231, an additional $10.60 would be provided for each prototype funded employee. Positive deviations from the state experience average of 6.2 years would cause funding to increase $424 per year (and visa versa). A further adjustment is made in funding for those school districts whose average percentage of school level administrator (principal and assistant principal) doctoral attainment is different from the statewide average of 4.0 percent, upon which the regression is based.

```
      Source |       SS       df       MS              Number of obs =     299
-------------+------------------------------           F(  4,   294) =   63.26
       Model |  7.4185e+09     4  1.8546e+09           Prob > F      =  0.0000
    Residual |  8.6191e+09   294  29316722.4           R-squared     =  0.4626
-------------+------------------------------           Adj R-squared =  0.4553
       Total |  1.6038e+10   298  53817373.3           Root MSE      =  5414.5

------------------------------------------------------------------------------
      salary |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
prior_stat~e |   423.5721   52.88724     8.01   0.000     319.4865    527.6576
school_en~lk |   10.59627   1.070675     9.90   0.000     8.489114    12.70343
   doctorate |   5157.783   1596.522     3.23   0.001     2015.723    8299.843
assistant_~l |  -10668.48    931.061   -11.46   0.000    -12500.87   -8836.091
       _cons |   60826.57   628.2934    96.81   0.000     59590.05    62063.09
------------------------------------------------------------------------------
```

Classified Staff Adjustments

The Campbell Court also required that cost-based funding recognize the level of responsibility and experience of classified staff. This was done by using econometric techniques to investigate the relationship between responsibility and experience to pay. We distinguish responsibility by job title for different types of classified staff.

Custodians and Groundskeepers.

The recalibration prototypes allocate positions for maintenance and grounds keepers, as well as custodians. Compensation for these positions was calculated by assuming that the state funds a full-time employee working 2080 hours annually. In fact, the average worker in this category works only 1950 hours annually, indicating that the funding model is building in funding for work hours beyond what is currently utilized on average. Hourly wages are estimated using standard econometric techniques. The analysis established a beginning level hourly pay for those workers without experience, the additional pay generated for each year of experience, and the average hourly pay differential separating the two employee classification groupings. The average beginning pay for custodians was estimated to be $21,091 and for groundskeepers, $26,333. The value of each year experience is $404. Based on state-wide averages, a school level custodian with the state average characteristics would be paid $24,521. The model would provide $30,489 for a district based employee. District level funding is set based on each district's FTE-weighted, average years of experience for all employees in these job titles.

The underlying regression results are displayed below. The results are calculated from 896 employees with full-time assignment and hourly wages between $5.50 and $70 per hour. Those outside of this range were considered to be implausibly paid on an hourly basis. The explanatory variables are highly statistically significant and the equation itself explains nearly 40 percent of the variation in the dependent variable.

```
      Source |       SS       df       MS              Number of obs =     896
-------------+------------------------------           F(  2,   893) =  276.61
       Model |  3826.76893     2  1913.38447           Prob > F      =  0.0000
    Residual |  6177.09786   893  6.91724285           R-squared     =  0.3825
-------------+------------------------------           Adj R-squared =  0.3811
       Total |  10003.8668   895  11.1775048           Root MSE      =  2.6301

------------------------------------------------------------------------------
    hrlywage |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
state exper  |   .2158723   .0115211    18.74   0.000     .1932607    .2384839
maint/grounds|   2.524156   .2061536    12.24   0.000     2.119554    2.928758
       _cons |    10.1444   .1410878    71.90   0.000       9.8675     10.4213
------------------------------------------------------------------------------
```

Secretaries and Clerical Staff.

The recalibration prototypes provide staffing for secretarial and clerical staff at the central office and building level. The model provides funding for personnel working 2080 hours at the district level and both 2080 and 1600 hours at the building level. The funding levels are built up from an analysis of hourly wages paid to 1019, secretarial and clerical staffers. The underlying regression analysis relates hourly pay to the years of prior state experience, the number of hours worked, and whether the staff member works at the district or building level. Each of the explanatory variables included in the regression is highly statistically significant and correctly signed. The model explains over 40% of the variation in hourly wages. Based on these results, beginning central office staff would be paid $25,229 and building level staff, $16,774 for the 1600 hour position and $22,546 for the 2080 hour position. State-wide, the weighted average, prior state experience for this group of employees is 9.5 years. This would result, for an employee with the average level of experience, in additional funding of $3,754 for an employee working 2080 hours, and $2,869 for an employee working 1600 hours, based on the regression result which credits $.19 per hour for each year of prior state experience. District funding is adjusted to reflect district weighted deviations from the state-wide average. For a district with the state's average experience characteristics, $19,656 would be provided for each allocated building level staffer working 1600 hours, $26,292 for each building level staffer working 2080 hours, and $28,975 for each district level staffer.

```
      Source |       SS       df       MS              Number of obs =    1019
-------------+------------------------------           F(  3,  1015) =  245.56
       Model |  3565.02648     3  1188.34216           Prob > F      =  0.0000
    Residual |  4911.88949  1015  4.83929999           R-squared     =  0.4206
-------------+------------------------------           Adj R-squared =  0.4188
       Total |  8476.91597  1018  8.32702944           Root MSE      =  2.1998

------------------------------------------------------------------------------
    hrlyrate |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    stateexp |   .1892319   .0086566    21.86   0.000     .1722449    .2062188
  work_hours |   .0007441   .0001686     4.41   0.000     .0004133    .0010749
     central |   1.293169   .1498263     8.63   0.000     .9991638    1.587173
       _cons |   9.300956   .2518426    36.93   0.000     8.806764    9.795148
------------------------------------------------------------------------------
```

Media Technicians. The recalibration prototypes provide a staffing allocation for media technicians. The recommended funding level for each technician provided by the model is based on the compensation received by 88 such technicians, currently working state-wide. Since the model funds full-time positions the analysis is restricted to the 67 technicians who report full time assignment. Positions are funded based on an annual 2040 hour work year.[49]

As required by the Campbell ruling adjustments for experience and education are incorporated. The regression results explain over 40% of the variation in hourly wages for this employee category. The explanatory variables are all highly statistically significant and correctly signed. Beginning salaries for media technicians are calculated to be $32,987 (for technicians without any educational or experience supplement). The model would provide additional funding of $14,035 for a media technician with a bachelor's degree. Each year of state experience is worth $645. State-wide, the average years of prior state experience is 4.5 and the average percentage of technicians with bachelor's degrees is 13.3%. A district with the state average characteristics of a media technician would receive $37,754 for each allocated position. Funding is adjusted to reflect the district's, FTE-weighted average experience and education level for this employee category, relative to the state average.

```
      Source |       SS       df       MS              Number of obs =      67
-------------+------------------------------           F(  2,    64) =   24.25
       Model |  710.805956     2  355.402978           Prob > F      =  0.0000
    Residual |  938.114809    64  14.6580439           R-squared     =  0.4311
-------------+------------------------------           Adj R-squared =  0.4133
       Total |  1648.92076    66   24.983648           Root MSE      =  3.8286

------------------------------------------------------------------------------
      hrlywg |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
prior_stat~e |   .3160912   .0867028     3.65   0.001     .1428824       .4893
has_bachel~s |   6.881895   1.414256     4.87   0.000     4.056594    9.707196
       _cons |   16.17217   .6164477    26.23   0.000     14.94068    17.40367
```

Aides.

The recalibration prototypes provide staffing for aides, primarily for non-instructional purposes. The model provides funding for 1480 annual hours for each full-time equivalent aide. This is based on a 185 contract day year and an 8 hour per day workload. The funding levels are built up from an analysis of hourly wages paid to nearly 2700, full and part-time aides currently employed by Wyoming school districts. The underlying regression analysis relates hourly pay to the years of prior state experience and whether the aide holds a bachelors degree or higher. The model explains 26% of the variation in hourly wages for this group of employees, and the explanatory variables are highly, statistically significant and correctly signed. The value of an additional year of prior state experience for this 1480 hour funded position is $254. State-wide, 7% of employees in this category hold bachelors degrees and have had 4.8 years of prior state experience. A district whose average aides characteristics matched the state average for experience and education would be funded $14,828 for each allocated position. The funding

[49] Only 2 media technicians in the data report working more hours annually.

model would adjust this average funding level for each districts specific education and experience profile, relative to the state average.

```
      Source |       SS       df       MS              Number of obs =    2678
-------------+------------------------------           F(  2,  2675) =  468.95
       Model |  2652.29307     2  1326.14653           Prob > F      =  0.0000
    Residual |  7564.63283  2675  2.82790012           R-squared     =  0.2596
-------------+------------------------------           Adj R-squared =  0.2590
       Total |  10216.9259  2677  3.81655805           Root MSE      =  1.6816

------------------------------------------------------------------------------
      hrlywg |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        bach |   .9937642   .1269435     7.83   0.000     .7448468    1.242682
prior_stat~e |   .1714925    .005747    29.84   0.000     .1602234    .1827616
       _cons |   9.138117   .0435754   209.71   0.000     9.052672    9.223562
```

Figure 1: Wyoming Teacher Salary Increases Relative to Various Inflation Measures

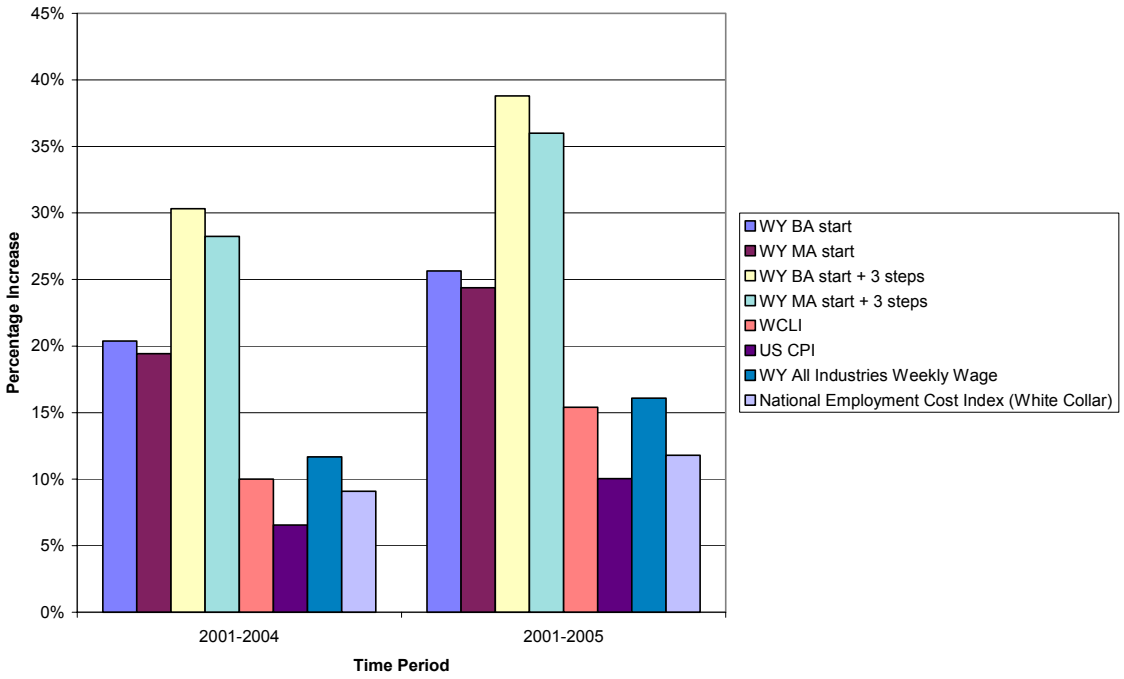


Figure 2: Teacher Salaries - AY 2004

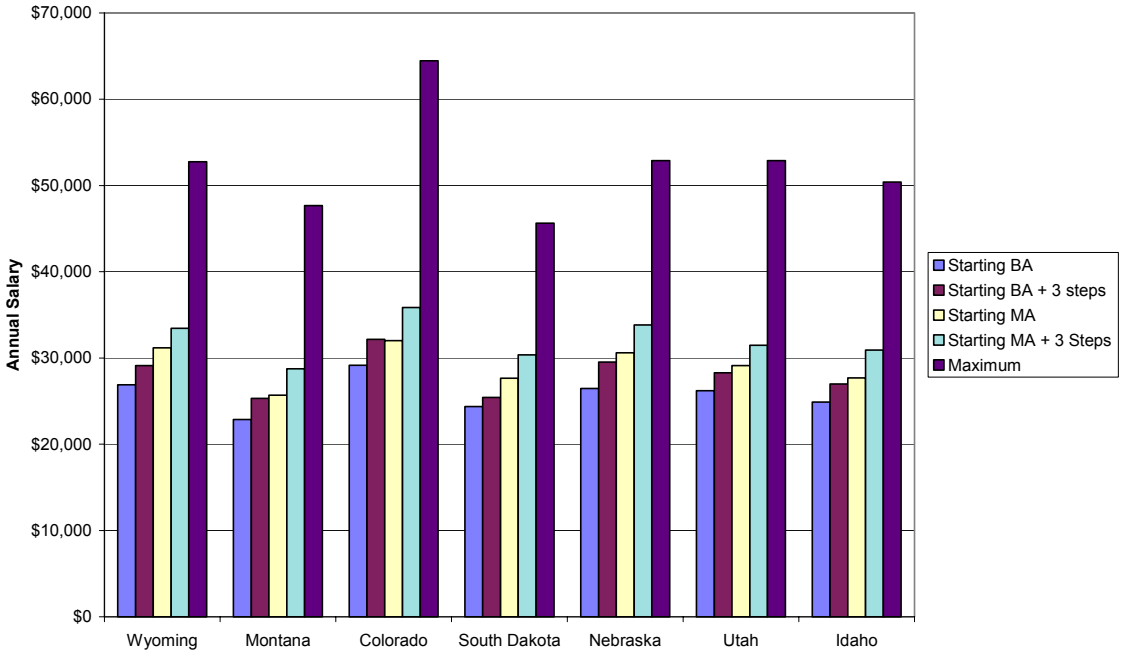


Figure 3: Teacher Salaries - AY 2005

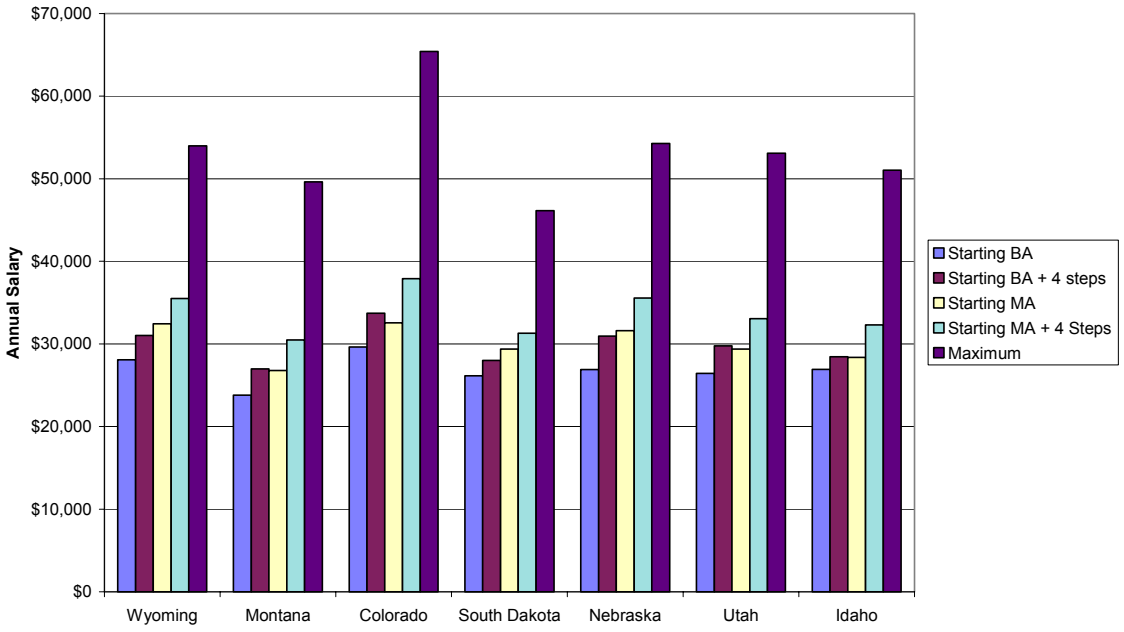


Figure 4: Teacher Salaries as % of Wyoming Salaries - AY2004

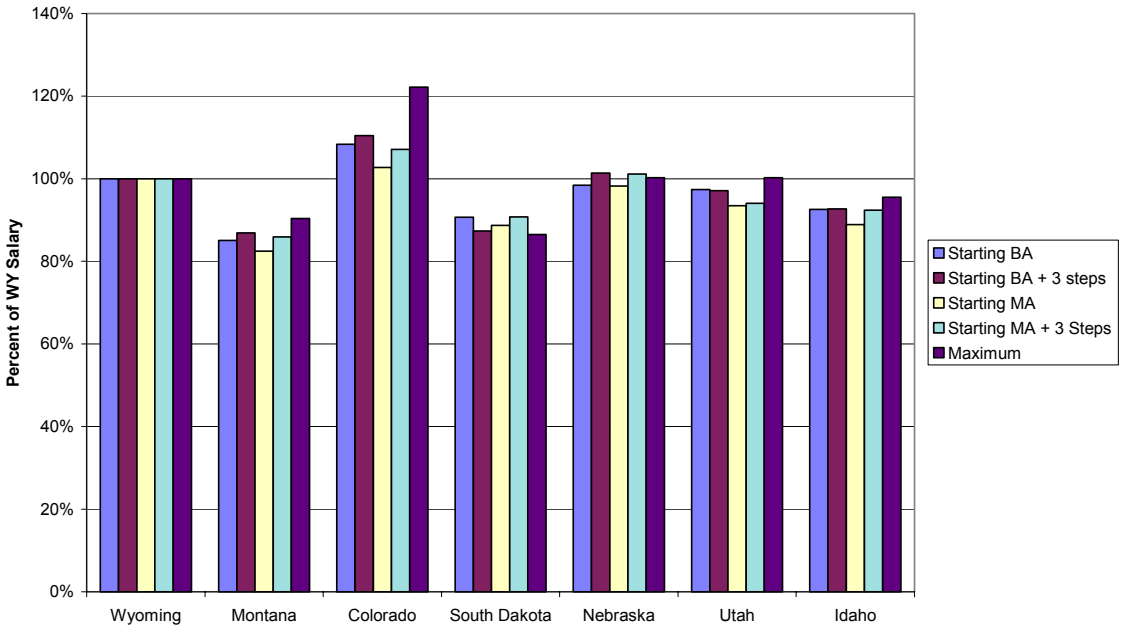


Figure 5: Teacher Salaries as % of Wyoming Salaries - AY2005

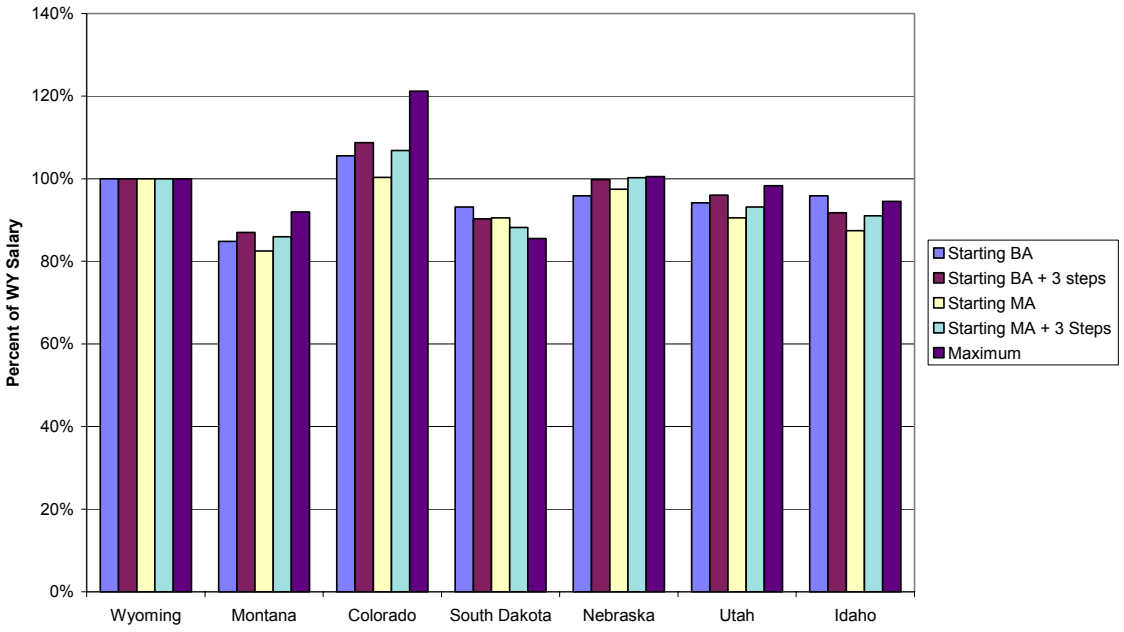


Figure 6: Teacher Salary Increases - AY2001-AY2004

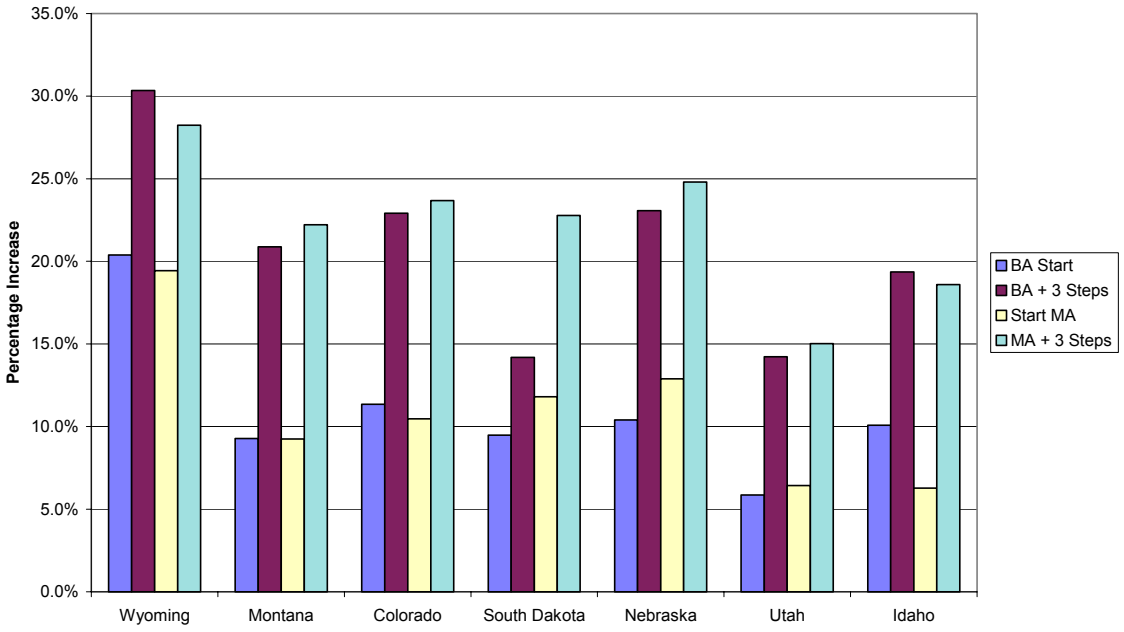


Figure 7: Teacher Salary Increases - AY2001-AY2005

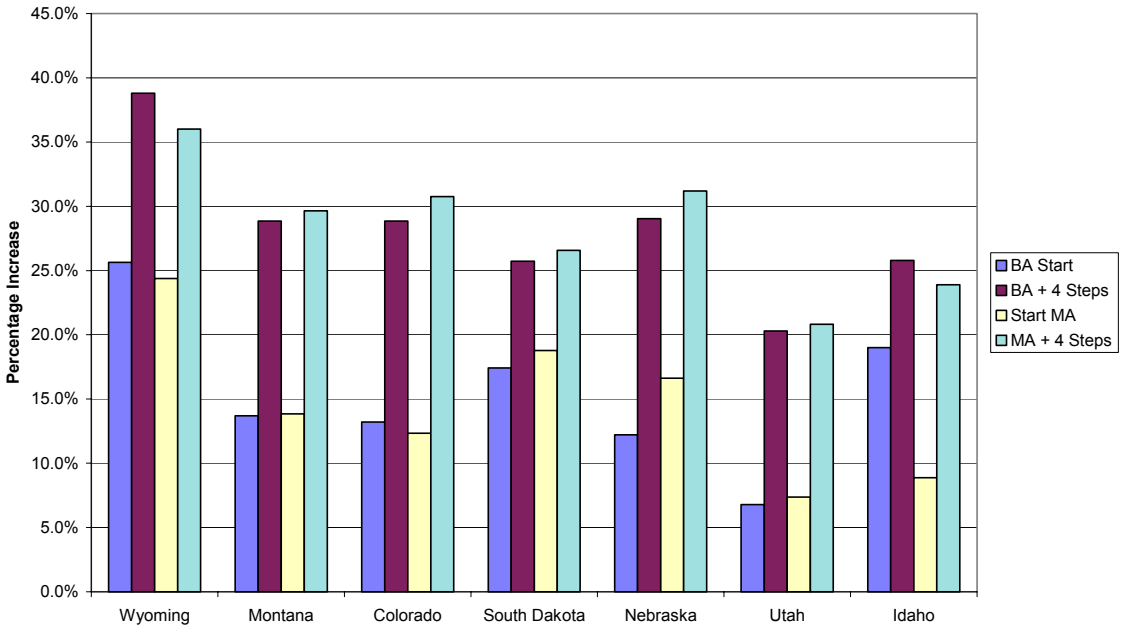


Figure 8: Teacher Salaries Increases as % of Wyoming Salary Increases - AY2001-AY2004

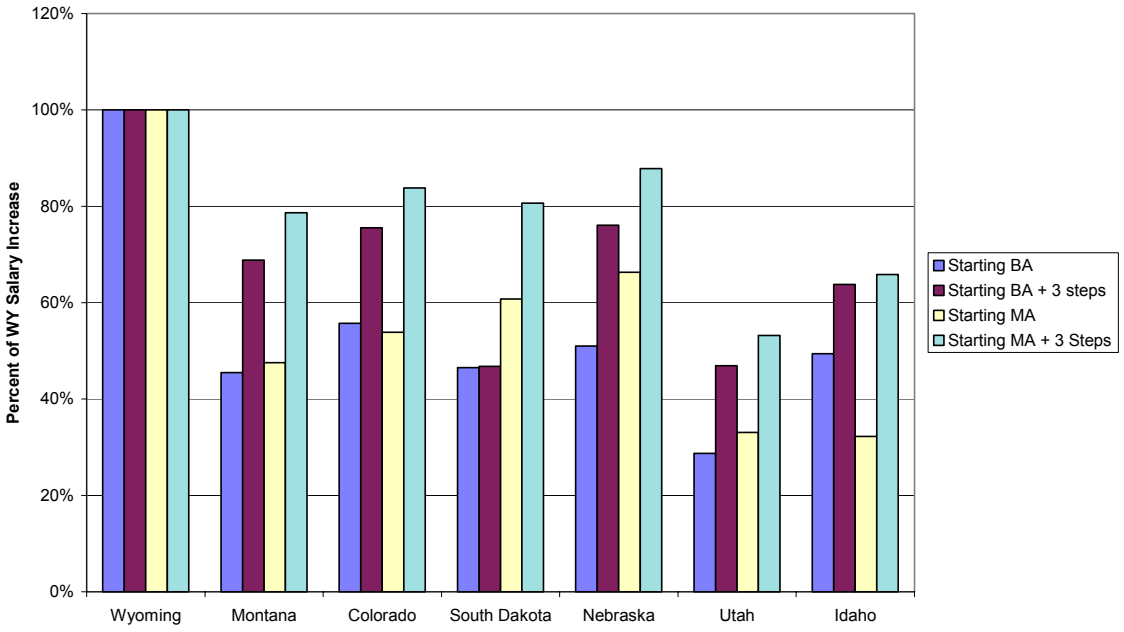


Figure 9: Teacher Salaries Increases as % of Wyoming Salary Increases - AY2001-AY2005

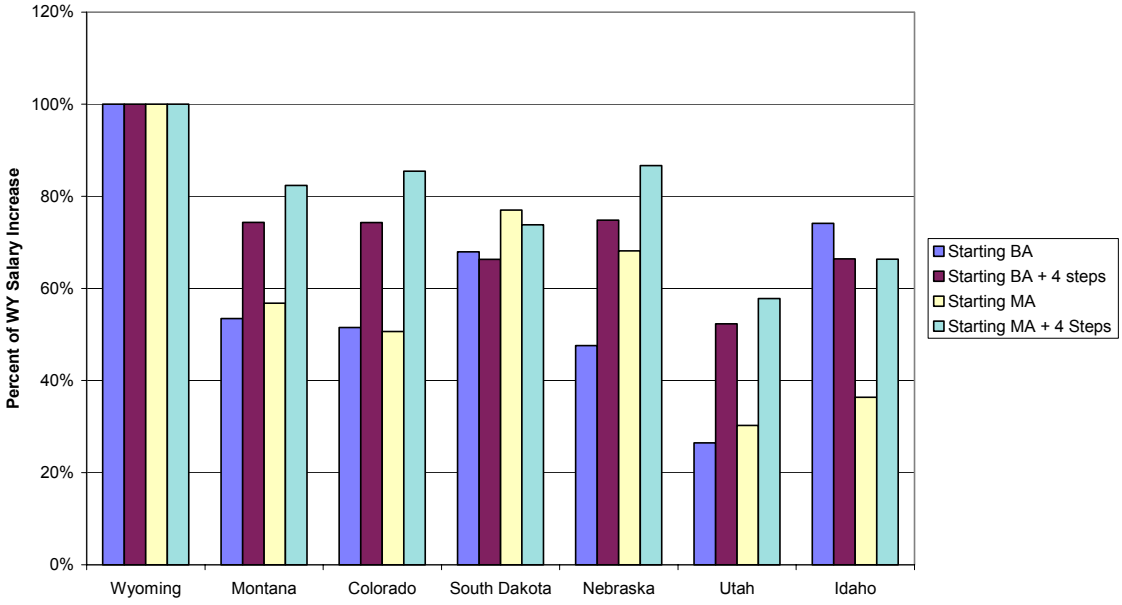
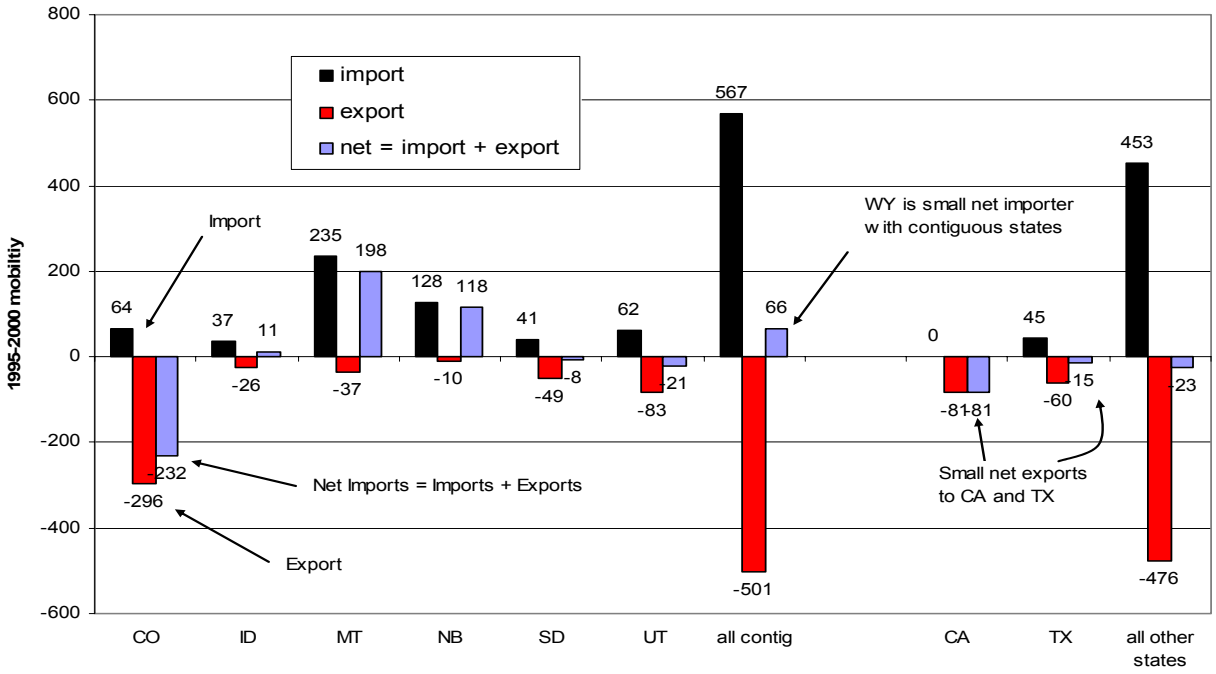
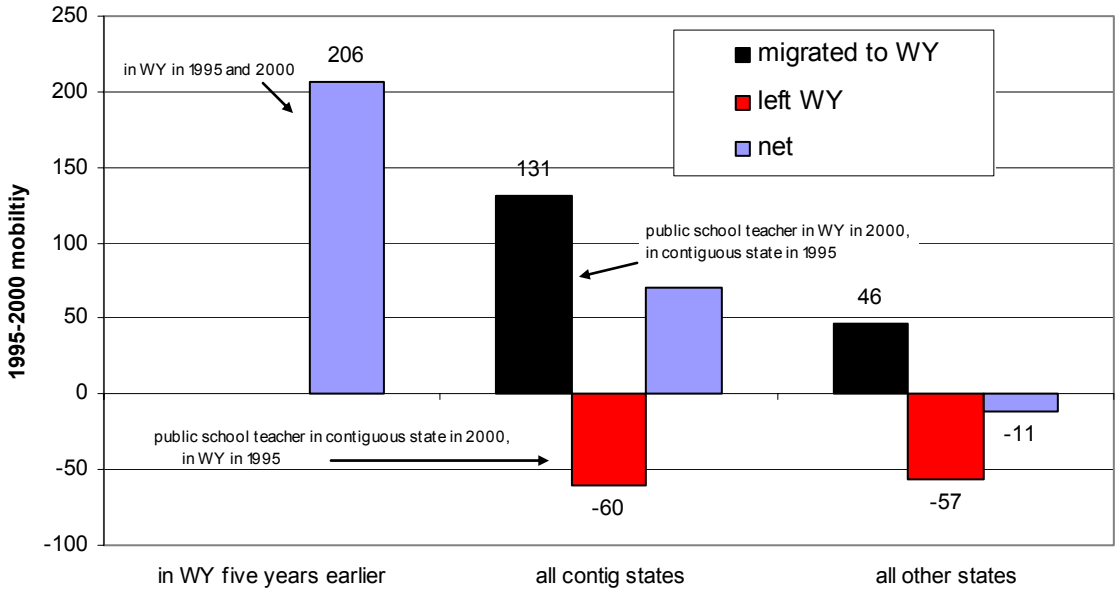


Figure 10: Five Year Mobility of Wyoming Public School Teachers: Number of Teachers Imported(+) or Exported(-) 1995-2000



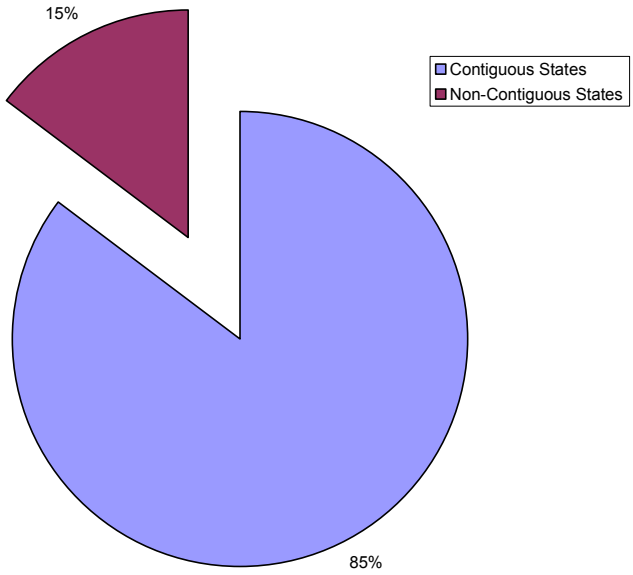
Source: 2000 Census of Population, PUMS

Figure 11: Location of Public School Teachers Aged 25 and Younger Five Years Earlier: Wyoming and Surrounding States



Source: 2000 Census of Population, PUMS

Figure 12: Birthplace of Wyoming Full-Time Public School Teachers Aged 25 or Younger



Appendix G
Summary of Wyoming O&M Model Funding
November 2005

Overview

The list of eligible sites, buildings and schools were obtained from the WDE school database, the 2004-05 facility inventory of the School Facilities Commission, and more recent SFC raw site and building datasets that were last updated in July of 2005.

Data

Data used in the O&M model include:

- 2005-06 ADM counts by school
- 2004-05 district GF operating expenditures as reported by the WDE
- Model generated teacher counts, consisting of K-12 classroom/core teachers; elementary, middle and high school specials; additional Voc Ed teachers; other specialist teachers; minimum elementary school teachers; and small ADM teachers
- Actual educational GSF
- Adequacy standard allowable educational GSF per building
- Actual classroom counts as reported by the SFC
- Year of construction
- Site acreage

Colocated School Programs

The revised method for handling colocated schools is to plug total ADM, teacher counts, classroom counts, and GSF into the funding model's record for the highest school level contained in the building. For example, if a colocated school building houses an elementary, middle and high school, school building totals will be aggregated into the high school record and the entire building will be treated as a high school for O&M funding purposes. Data for the other levels will be zeroed out. A total of 59 school programs are involved.

In the first version of the model, schools/programs that were colocated in a single building were included in the model multiple times for the sake of simplicity. For example, if the model identified three separate school programs (elementary, middle and high school) located in one building, the GSF and number of classrooms for that building are counted three times for the purposed of calculating FTE custodians and maintenance workers. This resulted in an over count of GSF and classrooms state wide of 2.1 million GSF and 825 classrooms.

Custodians

Custodian FTE are calculated on the basis of four factors: 1) number of classroom teachers (as defined above); 2) school ADM; 3) number of classrooms as reported by the SFC; and 4) the lesser of actual educational GSF or SFC allowable educational GSF adjusted up by 125% for

2006-07 (same data as used for SFC major maintenance calculation). These four factors are added together and divided by four to arrive at the preliminary FTE. The factor for each of these components is derived by finding the ratio of a school's actual data to adequacy standards reported by Zureich. This base FTE is further adjusted by an additional 0.5 FTE for secondary schools. Custodian FTEs for non-educational buildings are based solely on the GSF factor, which is limited to 10% of a district's total allowable educational GSF.

Maintenance Workers

Maintenance worker FTEs are calculated on the basis of four factors: 1) building (a factor of 1 for all buildings); 2) the lesser of actual educational GSF or SFC allowable educational GSF adjusted up by 125% for 2006-07 (same data as used for SFC major maintenance calculation); 3) school ADM; and 4) GF operating expenditures. These four FTE factors are added together and divided by four to arrive at a base FTE. The factor for each of these components is derived by finding the ratio of a school's actual data to adequacy standards reported by Zureich. The base number is further adjusted for 1) school level (base FTE is multiplied by 0.8 for elementary, 1.0 for middle, and 2.0 for high schools); 2) building age where schools under 10 years old are multiplied by a factor of .95 and over 30 years old by a factor of 1.1; and 3) small district size where FTE are multiplied by a factor of 1.1 for under 1,000 ADM. It is assumed that the maintenance worker FTEs determined on the basis of a district's total allowable educational GSF for schools are sufficient to service all buildings in a district, both educational and non-educational.

Groundskeepers

Groundskeeper FTEs are determined at the site rather than building/program level. The number of FTEs for all sites, both educational and non-educational, is based on the number of acres of the site and the standard for the number of annual work hours per acre (93). The FTE calculation assumes a 2,008 hour work year for groundskeepers. The initial FTE is adjusted for the primary school level or use of the site, with non-educational and elementary school sites received no additional adjustment, middle school sites receiving an adjustment factor of 1.5 and high school sites an adjustment factor of 2.5.

Supplies

Funding for O&M supplies is calculated at a rate of $0.55 per GSF. GSF is equal to the lesser of actual educational GSF or SFC allowable educational GSF adjusted up by 125% for 2006-07 (same data as used for SFC major maintenance calculation). Funding for supplies for non-educational space is equal to 10% of a district's total allowable educational GSF.

Utilities

Funding for utilities is based on actual 2004-05 district expenditures as reported by the WDE.