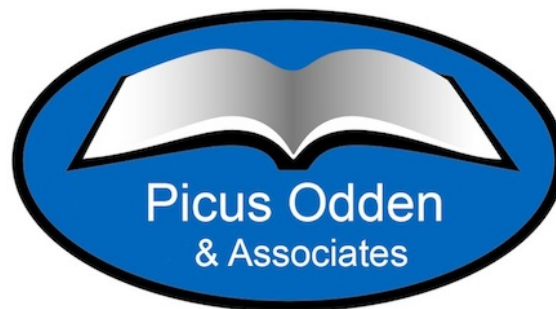


**AN EVIDENCE-BASED APPROACH TO SCHOOL  
FINANCE ADEQUACY IN MICHIGAN:  
Determining the Cost for Funding Educational Achievement  
for All Michigan Students**

**Prepared for the  
Oakland Schools Education Foundation  
Under contract with Augenblick Palaich and Associates**



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**January 2018**



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# **An Evidence-Based Approach to School Finance Adequacy In Michigan**

## *Evidence-Based Model Overview*

Using the Evidence-Based (EB) Model, this section provides a set of recommendations that can be used to determine how Michigan could provide adequate funding to all school districts to help them offer every Michigan student an equal opportunity to achieve to the state's college and career ready standards. The sections that follow this introduction describe the EB model in detail. The first describes the school improvement theory that undergirds the EB funding model. It draws from research POA and others have conducted on schools that have dramatically moved the student achievement needle. Such schools exist across the country and vary by location – urban, suburban and rural – and by school size – large, medium, and small.

The next section “unpacks” the elements of an effective school, reviews and summarizes the research supporting the individual elements, and includes specific recommendations for every element of the model. This includes class size, extra help for struggling students, professional development, student support services (including guidance counselors and nurses), and ways that instruction and teachers can be organized to bolster their effectiveness to increase student performance and reduce achievement gaps linked to student demographics.

Following preparation of the first three sections, four professional judgment panels were created to review the core recommendations in using the EB Model to Identify Adequacy for Michigan Schools section. These panels in Michigan met over a three-day period in October 2017. The Evidence-Based Professional Judgment Panels section presents the findings from the four panel meetings. The findings are organized into three categories: panel suggestions for change to the EB model that led to Michigan specific modifications of the EB model; panel suggestions for changes to the EB model that the study team believes are not needed based on our reading and interpretation of current educational research; and panel commentary on the EB elements that were generally supported by the panels.

The Final EB Michigan Recommendations section offers a summary of the final estimated EB costs using the accompanying EXCEL-based computer simulation. Please note this report on the EB model does not include either transportation or capital constructions costs.

The following metaphor shows how the EB funding model, and the school improvement model embedded within it, can be viewed. The EB approach to school finance adequacy provides a set of resource and program recommendations that can be called the “Education Hybrid Car.” The typical hybrid car costs about what the average car costs in America, but gets double the miles per gallon (50 v. 25 miles per gallon). One can easily spend more on a car than the cost of a basic hybrid (about \$25,000-\$30,000) but not get the high mileage; for example, buying a speedy V-8 engine-powered car, with moon roof and leather. If one is interested in high gas mileage – or, in this case, better school performance – one can easily spend much more and get neither.

The EB School model costs about the average of what is currently spent on schools across the country (Odden, Picus & Goetz, 2010), but the school cases that the study team have studied and which deploy strategies that are funded by the EB model (e.g., Odden, 2009), generally produce twice the level of student achievement. It is the EB study team's professional position that if schools use the resources in the model as indicated in The Evidence Based School Improvement Model section, student achievement in Michigan should dramatically rise. The following sections describe the high performance EB school funding model.

### *The Evidence-Based School Improvement Model*

The intent of the Evidence-Based Model is threefold:

1. To identify the array of educational goods that would provide each student an equal opportunity to meet the state's student performance standards;
2. To identify the costs of that basket of education goods; and
3. To provide each school district with adequate funds so that it could purchase and provide that basket of goods appropriately to all its students.

Although a direct linkage between funding and student performance does not exist, the Evidence-Based (EB) model is designed to identify a level of resources that would enable all districts and schools to provide every student with robust opportunities to meet college and career ready standards.

No matter what course of studies a high school student completes – college prep or career tech – all of Michigan's students are expected to achieve to college and career-ready standards in order to be competitive – after high school or college – in today's global, knowledge-based economy. This includes children from low-income homes, students of color, English language learners (ELL) and students with disabilities. The basket of educational goods and services and a cost-based funding model to support that basket must be sufficiently robust to allow students in all school districts in the state to have sufficient opportunities to attain these rigorous standards.

Before presenting the details of, and research supporting, each component of the Evidence-Based approach to school finance adequacy, this section provides a more general description of the school improvement model that undergirds the EB Model used to estimate school finance adequacy for Michigan.

### **The High-Performance School Model Embedded in the Evidence-Based Approach to School Finance Adequacy**

The EB Model used to estimate a cost-based spending level for schools has been designed to allow districts and schools to provide every child with an equal opportunity to learn to state performance standards. The EB Model is unique in that it is derived from research and best practices that identify programs and strategies that boost student learning. Further, the formulas and ratios for school resources developed from that research have been reviewed by dozens of educator panels in multiple states over the past decade. The EB Model relies on two major types of research:

1. Reviews of research on the student achievement effects of each of the EB Model’s individual major elements, with a focus on randomized controlled trials, the “gold standard” of evidence on “what works.”
2. Studies of schools and districts that have dramatically improved student performance over a four- to six-year period – what is sometimes labeled “a doubling of student performance” on state assessments.

As a result of our research and work in other states, the EB approach today is more explicit in identifying the components of a school improvement model, and it does a better job of articulating how all the elements of the EB Model are linked at the school level to strategies that, when fully implemented, produce notable improvements in student achievement (see Odden & Picus, 2014; Chapter 5).

High performing and improving schools have clear and specific student achievement goals, including goals to reduce achievement gaps linked to poverty and minority status. The goals are nearly always specified in terms of performance on state assessments.

Compared to traditional schools where teachers work in isolated classrooms, improving schools organize instruction differently. Regardless of the context – urban, suburban, or rural, rich or poor, large or small – improving and high performing schools organize teachers into collaborative teams: grade level teams in elementary schools and subject or course teams in secondary schools. With the guidance and support of instructional coaches, the teacher teams work with student data – usually short-cycle or formative assessment data – to:

- Plan standards-based curriculum units;
- Teach those units simultaneously;
- Debrief on how successful the units were; and
- Make changes when student performance does not meet expectations.

This collaborative teamwork makes instruction “public” over time by identifying a set of instructional strategies that work in the teachers’ school. Over time all teachers are expected to use the instructional strategies that have been demonstrated to improve student learning and achievement.

High performing and improving schools also provide an array of “extra help” programs for students struggling to achieve to standards. This is critical because the number of struggling students is likely to increase as more rigorous programs are implemented to prepare all students for college and careers. Individual tutoring, small group tutoring, after-school academic help and summer school focused on reading and mathematics for younger students, and courses needed for high school graduation for older students, represent the array of “extra help” strategies these improving schools deploy. Their approach is to “hold standards” constant and vary instructional time.

These schools exhibit multiple forms of leadership. Teachers lead by coordinating collaborative teams and through instructional coaching. Principals lead by structuring the school to foster instructional improvement. The district leads by ensuring that schools have the resources to deploy the strategies outlined above with a focus on aggressive student performance goals, improving instructional practice and taking responsibility for student achievement results.

High performing and improving schools seek out top talent. They know that the challenge to prepare students for the competitive and knowledge-based global economy is difficult and requires smart and capable teachers and administrators to effectively get the educational job done.

The study team continues to enhance the details of the strategy of school improvement embedded in the EB Model. The most recent summary of the research undergirding the EB model can be found in Odden and Picus (2014) school finance textbook, and in several books that profile schools and districts that have moved the student achievement needle (Odden & Archibald, 2009; Odden, 2009; Odden, 2012). The study team recently studied dramatically improving schools in Maryland, Vermont, and Maine as part of school finance studies in those states and found the theory of improvement embodied in the EB Model is reflected in nearly all the successful schools studied (Picus, Odden, et al., 2011; Picus, Odden, et al., 2013; Odden & Picus, 2015b). In addition, other researchers and analysts have found similar features of schools that significantly improve student performance and reduce achievement gaps (e.g., Blankstein, 2010, 2011; Chenoweth, 2007, 2009, 2017).

After a comprehensive set of studies and analyses, Greg Duncan and Richard Murnane (2014) reached conclusions similar to those embedded in the EB Model. They note that if all students in a school are to have a chance at success in the emerging global economy, they will need high-quality preschool programs, followed by effective elementary and secondary schools. The key features needed in each school include: 1) leadership focused on improving instructional practice, 2) within-school organization of teachers into teams that over time create a set of effective instructional practices and deploy them systematically in all classrooms, 3) a culture of assistance (e.g., instructional coaches and ongoing professional development) and accountability (e.g., adults taking responsibility for the impact of their school actions on student performance), and 4) an array of extra help strategies to extend learning time for any student who needs more time to achieve to standards.

Although the details of studies of improving and high performing schools vary, and different authors highlight somewhat different elements of the process, the overall findings are more similar than different. This suggests all schools can improve if they have adequate resources AND deploy those adequate resources in the most effective ways.

The EB Model offers a framework for the use of resources by districts and schools to help them focus those resources on programs and strategies that would allow them to produce substantial gains in student academic performance. In addition to the above more global description of the EB effective schools, the study team organized the key elements of the school improvement model embedded in the EB Model into ten areas. In general, schools and districts that produce large gains in student performance follow ten similar strategies (see Chapter four and five of Odden & Picus, 2014; Odden, 2009), resources for each of which are included in the EB Model:

1. Analyze student data to become deeply knowledgeable about performance issues and to understand the nature of the achievement gap. The test score analysis usually first includes review of state test results and then, over time, analysis of formative/short cycle (e.g., Renaissance Learning Star Enterprise) as well as benchmark assessments (e.g., NWEA MAP) to help tailor instruction to precise student needs, to progress monitor students with an Individual Education Plan to determine whether interventions are working, and to follow the performance of students,

classroom, and the school over the course of the academic year. Improving schools are “performance data hungry.”

2. Set high goals such as aiming to educate at least 95% of the students in the school to proficiency or higher on state reading and math tests; seeing that a significant portion of the school’s students reach advanced achievement levels; having more high school students take and pass AP classes; and making significant progress in closing the achievement gap. The goals tend to be explicit and far beyond just producing “improvement” or “making AYP.” Further, because the goals are ambitious, even when not fully attained they help the school produce large gains in student performance.
3. Review evidence on good instruction and effective curriculum. Successful schools throw out the old curriculum, replace it with a different and more rigorous curriculum, and over time create their specific view of what good instructional practice is to deliver that curriculum. Changing curriculum is a must for schools implementing more rigorous college and career ready standards. And such new curriculum requires changes in instructional practice. Successful schools also want *all* teachers to learn and deploy new content-based, instructional strategies in their classrooms and seek to make good instructional practice systemic to the school and not idiosyncratic to teachers’ individual classrooms.
4. Invest heavily in teacher training that includes intensive summer institutes and longer teacher work years, provide resources for trainers, and, most importantly, fund instructional coaches in all schools. Time is provided during the regular school day for teacher collaboration focused on improving instruction. Nearly all improving schools have found resources to provide instructional coaches to work with school-based teacher data teams, to model effective instructional practices, to observe teachers and to give helpful but direct feedback. This focus has intensified now that schools are delivering a more rigorous curriculum focused on educating all students to college and career proficiency levels. Further, professional development is viewed as an ongoing and not a “once and done activity.”
5. Provide extra help for struggling students and, with a combination of state funds and federal Title 1 funds, provide some combination of tutoring in a 1:1, 1:3, or 1:5 teacher to student format. In some cases, this also includes extended days, summer school, and English language development for all ELL students. These Tier 2 interventions in the Response to Intervention (RTI) approach to helping struggling students achieve to standards are absolutely critical. For many students, one dose of even high-quality instruction is not enough; many students need multiple extra help services in order to achieve to their potential. No school producing large gains in student learning ignored extra help strategies altogether or argued that small classes or preschool were substitutes.
6. Restructure the school day to provide more effective ways to deliver instruction. This includes multi-age classrooms in elementary schools, block schedules and double periods of mathematics and reading in secondary schools, and “intervention” periods at all school levels. Schools also “protect” instructional time for core subjects, especially reading and mathematics. Further, most improving schools today organize teachers into collaborative teams – grade level teams in elementary schools and subject/course teams in secondary schools. These teams meet during the regular school day, often daily, and collaboratively develop curriculum units, lesson plans to



teach them, and common assessments to measure student learning results. Further, teams debrief on the impact of each curriculum unit, reviewing student learning overall and across individual classrooms.

7. Provide strong leadership and support for data-based decision making and improving the instructional program, usually through the superintendent, the principal and teacher leaders. Instructional leadership is “dense” and “distributed” in successful schools; leadership derives from the teachers coordinating collaborative teacher teams, from instructional coaches, the principal and even district leaders. Both teachers and administrators provided an array of complementary instructional leadership.
8. Create professional school cultures characterized by ongoing discussion of good instruction with teachers and administrators taking responsibility for the student performance results of their actions. Over time, the collaborative teams that deliver instruction produce a school culture characterized by: 1) high expectations of performance on the part of both students and teachers, 2) a systemic and school-wide approach to effective instruction, 3) a belief that instruction is public and that good instructional practices are expected to be deployed by every individual teacher, and 4) an expectation that the adults in the school are responsible for the achievement gains made or not made by students. Professionals in these schools accept responsibility for student achievement results.
9. Bring external professional knowledge into the school, e.g., hiring experts to provide training, adopting new research-based curricula, discussing research on good instruction, and working with regional education service agencies as well as the state department of education. Successful schools do not attain their goals by “pulling themselves up by their own boot straps.” Faculty in successful schools aggressively seek outside knowledge, find similar schools that produce results and benchmark their practices, and operate in ways that typify professionals.
10. Finally, talent matters. Many improving schools today consciously seek to recruit and retain the best talent, from effective principal leaders to knowledgeable, committed, and effective teachers. They seek individuals who are mission-driven to boost student learning, willing to work in a collaborative environment where all teachers are expected to acquire and deliver the school’s view of effective instructional practice, and who are accountability focused.

Such successful schools also create a learning atmosphere inside the schools, have a school-wide approach to discipline and classroom management, and require that every student be accountable to any adult for his/her behavior and that all adults take interest in all students and hold them accountable for the behavioral practices in the school. In addition, these effective schools reach out to parents, insure that parents know the expectations of the school and help their children with homework, and welcome all parents into the school.

In sum, the schools studied that have boosted student performance deployed strategies strongly aligned with those embedded in the EB Model. These practices bolster POA’s claim that if funds are provided and used to implement these effective, research based, strategies, significant student performance gains should follow.

## *Using the EB Model to Identify Adequacy for Michigan Schools*

### **Introduction**

This section identifies the details of every element in the EB Funding Model. The five parts of this section include the following:

1. Staffing for core programs, which include preschool, full-day kindergarten, core teachers, elective/specialist teachers, substitute teachers, instructional facilitators/coaches, core tutors, core guidance counselors, nurses, supervisory aides, librarians, library aides, school computer technicians, principals/assistant principals, and school secretarial and clerical staff.
2. Dollar per student resources for gifted and talented students, professional development, instructional materials and supplies, formative/short cycle assessments, computers and other technology, career and technical education equipment and materials and extra duty/student activities.
3. Central functions, which include maintenance and operations, central office personnel and non-personnel resources.
4. Resources for struggling students including at-risk tutors, at-risk pupil support, extended day personnel, summer school personnel, ELL personnel, alternative school personnel and special education.
5. Personnel compensation resources including salary levels, health insurance, benefits for workers' compensation, unemployment insurance, retirement, and social security.

Each section provides an overview of the current research on the element discussed, and the specifics of the EB Model recommendation for the element.

### **Three Tier Approach**

Before proceeding, it is important to note that the design of the EB Model reflects the Response to Intervention (RTI) model. RTI is a three-tier approach to meeting student needs. Tier 1 refers to core instruction for all students. The EB Model seeks to make core instruction as effective as possible with its modest class sizes, provisions for collaborative time, and robust professional development resources. Effective core instruction is the foundation on which all other educational strategies depend. Tier 2 services are provided to students struggling to achieve to standards before being given an individualized education program (IEP) and labeled as a student with a disability. The EB Model's current Tier 2 resources include one core tutor for every prototypical school and additional resources triggered by at-risk and ELL student counts providing funding for tutoring, extended day, summer school, additional pupil support and ELL services. POA asserts later that the robust levels of Tier 2 resources allow schools to provide a range of extra help services, that often are funded only by special education programs, and that get many modestly struggling students back "on track," and thus reduce the levels of special education students. Tier 3 includes all special education services.

## Student Counts

The EB model recommends that states use an ADM student count to distribute general aid. To help district deal with the costs of declining enrollment, the model suggests states use the current year ADM count or the average of the previous three years, whichever is larger. The model also needs a measure of the number of students from poverty backgrounds to trigger specific resources. In the past, this usually has been the number of students eligible for the federal free and reduced-price lunch program. Since districts can now provide free lunches to all students if they have a large number of students from poverty, the count of free and reduced lunch students is not available in some districts, often the largest districts in the state. So, the issue is whether to use a different indicator. Illinois provides a good example of the latter and uses the non-duplicated count of children receiving services through the programs of Medicaid, the Supplemental Nutrition Assistance Program, the Children's Health Insurance Program, or Temporary Assistance for Needy Families. English Language Learning (ELL) students and students with disabilities will be as currently defined by the state.

Previously the EB model defined at-risk students as the non-duplicated count of students from poverty and ELL students, and provided additional resources that included tutoring, extended day, summer school and additional pupil support. In addition, all ELL students also received an additional allocation for ESL services. This definition confused most people who concluded that the model provided ELL students just the ESL resources. Consequently, the EB model has changed its approach. In this report, all ELL students trigger tutoring, extended day, summer school, ESL, and additional pupil support resources. Further, all non-ELL poverty students also trigger tutoring, extended day, summer school and additional pupil support resources. In addition, the model provides all ELL students additional ESOL resources. The model also describes how the EB model provides resources for students with disabilities.

## Prototypical Schools

A key component of the EB model is the use of prototypical schools and districts to indicate the general level of resources in schools and districts, and to serve as a heuristic to calculate the base per student amount, and then the student weights. The EB model identifies resources for prototypical elementary, middle, and high schools, as well as a prototypical district. The model needs to use specific sizes in order for the prototypes to indicate the relative level of resources in the schools. Although EB modeling is based on these prototypes, this does not imply Michigan should adopt new policies on school or district size.

## Research on School Size

School sizes differ substantially within and across all states. No state has a specific policy on school size, though some – including New Jersey and Wyoming – use prototypical school sizes to develop and/or operate their funding formula. A number of other states include “ideal” size configurations for different levels of schools in their facility guidelines – something that clearly creates incentives for specific school sizes.

Research on school size is quite consistent in its conclusions. Most of the research on school size addresses the question of whether large schools – those significantly over 1,000 students – are more efficient and more effective than smaller school units (schools of 300 to 500), and whether cost savings and performance improvements can be identified by consolidating small schools or districts into larger entities. The research generally shows that school units of roughly 400-600 elementary students and

between 500 and 1,000 secondary students are the most effective and most efficient (Lee & Smith, 1997; Raywid, 1997/1998; Ready & Lee, 2004).

Moreover, the research on diseconomies of small and large scale, which should consider both costs and outcomes, generally does not provide solid evidence for a consolidation policy. In an early review of the literature, Fox (1981) concluded that little research had analyzed output in combination with input and size variables. Ten years later, after assessing the meager extant research that did address costs as well as outcomes, Monk (1990) concluded that there was little support for either school or district consolidation, a conclusion also reached by Leithwood and Jantzi (2009).

In reviews of scale economies and diseconomies and potential cost savings from consolidation, Andrews, Duncombe & Yinger (2002) and Duncombe and Yinger (2007, 2010) found that the optimum size for elementary schools was in the 300-500 student range, and for high schools was in the 600-900 range. Both findings suggest that the very large urban districts and schools across America – and Michigan – are larger than the optimum size and perhaps need to be downsized somehow, but that the potential cost savings from consolidation of small districts and schools are realistically scant. In sum, the research suggests that elementary school *units* be in the range of 400-500 students and that secondary school *units* be in the range of 500-1,000 students.

These findings have been reinforced by several studies of small high schools in both New York City and Chicago, each of which had initiatives to create many smaller high schools, sometimes including several school units in one building. These schools generally enrolled 550 or fewer students, less than 400 students in Chicago K-8 schools. Schwartz, Stiefel and Wiswall (2013) found that achievement increased significantly in the New York City small high schools, a parallel finding of Barrow, Claessens and Schanzenbach (2010) in a similar set of experiments in Chicago high schools. Likewise, Lee and Loeb (2010) found that grade 6 and 8 math achievement was higher in small (less than 400 students) Chicago K-8 schools than in large ones (greater than 750 students).

#### The Evidence Based Model's Prototypical School Sizes

The EB approach starts by identifying resources for prototypical elementary, middle, and high schools with enrollments of 450, 450 and 600 respectively. It uses this approach and these prototypes to indicate the relative level of resources in schools, as well as to calculate a base per student cost. These prototypical school sizes reflect research on the most effective school sizes, although few schools are exactly the size of the prototypes. Although many schools in Michigan and other large urban states are larger than these prototypical school sizes, the prototypical sizes can still be used to determine a new base cost per student, as the new base cost per student would be provided for all students in a school or district, regardless of actual size. In other states with larger schools, this approach has been used with the suggestion that larger school buildings could organize their students into smaller “schools within school” units inside the larger building.

Additionally, as will be discussed in Element 21, the EB model begins with a prototypical district size of 3,900, which comprises four 450-student elementary schools, two 450-student middle schools, and two 600-student high schools. This configuration is then used to estimate a district-level cost per student. Several states have used the micro-EB formulas and ratios to estimate a base per student cost estimate for their foundation school finance formula. States using this approach include Arkansas, New Jersey, and

North Dakota. Although actual school sizes vary in each of those states, the prototypes provide good estimates of a base cost per student in the context of each of those states. POA’s Wisconsin Study (Odden et al., 2007) estimated a base per student cost using prototypical schools and a prototypical district, then compared that to a district specific cost estimate created by adapting the ratios and formulas to every school and district size. In Wisconsin, the difference between the two methods was about \$50 per student, a small amount in a base spending level of approximately \$10,000 per student.

The EB prototypes should not be construed to imply Michigan needs to replace all school sites with smaller or larger buildings or break school districts into smaller units; they are used as heuristics to determine the estimated base cost per student.

Table 1, below, provides a summary of how each element is calculated under the 2017 EB Model recommendations.

**Table 1**  
**Summary of 2017 Evidence-Based Model Recommendations**  
**2017 Evidence-Based Recommendation**

2017 Evidence-Based Recommendation	
Staffing for Core Programs	
1a. Preschool	Full day preschool for children aged 3 and 4. One teacher and one aide in classes of 15
1b. Full-Day Kindergarten	Full-day kindergarten program. Each K student counts as 1.0 pupil in the funding system
2. Elementary Core Teachers/Class Size	Grades K-3: 15 (Average class size of 17.3) Grades 4-5/6: 25
3. Secondary Core Teachers/Class Size	Grades 6-12: 25. Average class size of 25
4. Elective/Specialist Teachers	Elementary Schools: 20% of core elementary teachers Middle Schools: 20% of core middle school teachers High Schools: 33 1/3% of core high school teachers
5. Instructional Facilitators/Coaches	1.0 Instructional coach position for every 200 students
6. Core Tutors/Tier 2 Intervention	One tutor position in each prototypical school (Additional tutors are enabled through poverty and ELL pupil counts in Elements 22 and 26)
7. Substitute Teachers	5% of core and elective teachers, instructional coaches, tutors (and teacher positions in additional tutoring, extended day, summer school, ELL, and special education)
8. Core Pupil Support Staff, Core Guidance Counselors, and Nurses	1 guidance counselor for every 450 grade K-5 students 1 guidance counselor for every 250 grade 6-12 students 1 nurse for every 750 K-12 students (Additional student support resources are provided on the basis of poverty and ELL students in Element 23)
9. Supervisory and Instructional Aides	2 for each prototypical 450-student elementary and middle school 3 for each prototypical 600-student high school
10. Library Media Specialist	1.0 library media specialist position for each prototypical school

2017 Evidence-Based Recommendation	
11. Principals and Assistant Principals	1.0 principal for the 450-student prototypical elementary school 1.0 principal for the 450-student prototypical middle school 1.0 principal and 1.0 assistant principal for the 600-student prototypical high school
12. School Site Secretarial and Clerical Staff	2.0 secretary positions for the 450-student prototypical elementary school 2.0 secretary positions for the 450-student prototypical middle school 3.0 secretary positions for the 600-student prototypical high school
<b>Dollar Per Student Resources</b>	
13. Gifted and Talented Students	\$40 per student
14. Intensive Professional Development	10 days of student-free time for training built into teacher contract year, by adding five days to the average teacher salary \$125 per student for trainers (In addition, PD resources include instructional coaches [Element 5] and time for collaborative work [Element 4])
15. Instructional Materials	\$190 per student for instructional and library materials
16. Short Cycle/ Interim Assessments	\$25 per student for short cycle, interim and formative assessments
17. Technology and Equipment	\$250 per student for school computer and technology equipment
18. CTE Equipment/ Materials	\$10,000 per CTE teacher for specialized equipment
19. Extra Duty Funds/ Student Activities	\$300 per student for co-curricular activities including sports and clubs for grades K-12
<b>Central Office Functions</b>	
20. Operations and Maintenance	Separate computations for custodians, maintenance workers and groundskeepers, and \$305 per student for utilities
21. Central Office Personnel/ Non-Personnel Resources	A dollar per student figure for the Central office based on the number of FTE positions generated and the salary and benefit levels for those positions. Also includes \$300 per student for miscellaneous items such as Board support, insurance, legal services, etc.
<b>Resources for Struggling Students</b>	
22. Tutors	1.0 tutor position for every 100 ELL students and one tutor position for every 100 non-ELL poverty students
23. Additional Pupil Support Staff	1.0 pupil support position for every 125 ELL students and one tutor position for every 125 non-ELL poverty students
24. Extended Day	1.0 teacher position for every 120 ELL and for every 120 non-ELL poverty students.
25. Summer School	1.0 teacher position for every 120 ELL and for every 120 non-ELL poverty students.
26. ESL staff for English Language Learner (ELL) Students	As described above: 1.0 tutor position for every 100 ELL students 1.0 pupil support position for every 125 ELL students 1.0 extended day position for every 120 ELL students 1.0 summer teacher position for every 120 ELL students, In addition: 1.0 ESL teacher position for every 100 ELL students
27. Alternative Schools	One assistant principal position and one teacher position for every 7 ALE students in an ALE program. One teacher position for every 7 Welcome Center eligible ELL students.

2017 Evidence-Based Recommendation	
28. Special Education	<p>8.1 teacher positions per 1,000 students, which includes: 7.1 teacher positions per 1,000 students for services for students with mild and moderate disabilities and the related services of speech/hearing pathologies and/or OT PT. This allocation equals approximately 1 position for every 141 students.</p> <p style="text-align: center;"><b>Plus</b></p> <p>1.0 psychologist per 1,000 students to oversee IEP development and ongoing review.</p> <p style="text-align: center;"><b>In addition:</b></p> <p>Full state funding for students with severe disabilities, and state-placed students, minus the cost of the basic education program and Federal Title VIB, with a cap on the number covered at 2% of all students</p>
<b>Staff Compensation Resources</b>	
29. Staff Compensation	<p>For salaries: average of previous year For benefits:</p> <ul style="list-style-type: none"> <li>Retirement or pension costs: 25.56 %</li> <li>Health Insurance: \$12,000 per employee</li> <li>Social Security and Medicare: 7.65%</li> <li>Workers' Compensation: 0.6 %</li> <li>Unemployment Insurance: 0 % as the state fully reimburses districts for these costs</li> </ul>

**Staffing for Core Programs**

This section covers full-day kindergarten, core teachers, elective/specialist teachers, substitute teachers, instructional facilitators/coaches, core tutors, core guidance counselors, core nurses, substitute teachers, supervisory aides, library media specialists, principals/assistant principals, and school secretarial and clerical staff.

**1a. Preschool**

The EB model provides for a full-day preschool program for children ages three and four.

Model Element	2016 Evidence-Based Recommendation
1a. Preschool	Full day preschool for children aged three and four. One teacher and one aide in classes of 15.

**Analysis and Evidence**

Preschool education has received considerable attention in recent years, including a major push to expand preschool education by the federal government. According to the National Institute for Early Education, states enrolled 1.5 million children in public pre-school programs in 2016.<sup>1</sup> Underscoring that movement, there is increasing evidence that high-quality preschool programs are an effective way to help all children succeed in school (Kauerz, 2006). Research shows that preschool programs are most effective for at-risk children who are not likely to come to kindergarten fully prepared. When paired with well-resourced

<sup>1</sup> See <http://nieer.org/state-preschool-yearbooks/yearbook2016>.

elementary schools, preschool programs can help at-risk children catch-up with their better-prepared schoolmates (Takanishi, 2016; Takanishi & Kauerz, 2008). In other words, there is growing recognition that integrating preschool programs with the traditional public-school system, particularly grades K-3, could strengthen the effect of both preschool programs and programs in grades K-3.

This analysis of preschool focuses on estimating the structure and costs of establishing universally available, voluntary, high-quality programs for three- and/or four-year-olds. It discusses how those preschool programs would be integrated with existing K-3 programs the EB model provides. The balance of this part is divided into five segments. The first briefly summarizes the research base supporting preschool education programs, the second summarizes research on the impact of a statewide preschool program, the third summarizes fiscal returns to preschool programs, and the fourth identifies the research base for integrating preschool programs with K-3 programs into a more unified PreK-3 program. The fifth describes the EB approach to providing for preschool programs.

The Case for Preschool. There is continued activity across the United States to establish universal preschool programs for four-year-old children and in increasing numbers of instances for three-year-olds as well. This activity stems from the increased demands on schools through standards-based education reforms, the expectations for which have now been ratcheted up to include preparing all students for college or careers, and a growing recognition that early childhood development programs can have an impact on student outcomes well beyond the preschool years. Much of the research on the effectiveness of PreK-3 programs has focused on the preschool component, with less research on the advantages of integrated programs that continue from preschool through the grade three.

Drawing from major studies that found long-term positive effects of preschool programs on student learning, Reynolds and Temple (2008) constructed five possible pathways through which early childhood development programs produced their impacts, including:

1. A cognitive advantage pathway that leads to enhanced literacy, language and numeracy skills, and better school readiness (see also Conger, 2008 for evidence on the impact of early learning on acquisition of English language skills for ELL students).
2. A family support pathway describing benefits from greater parental involvement in education and enhanced parenting skills (see also Kalil & Crosnoe, 2008).
3. A school support pathway that argues for high-quality education programs beyond preschool to strengthen the learning advantages of early childhood development programs, a pathway allowed by the Evidence-Based funding model.
4. A social adjustment pathway suggesting benefits from increased classroom and peer social skills and positive teacher-child relationships.
5. A motivational pathway arguing that early education programs provide benefits in terms of achievement motivation and commitment to school.



Whatever the pathway, most researchers find that high-quality preschool, particularly for students from lower income backgrounds, significantly affects future student academic achievement as well as other desired social and community outcomes (Barnett, 2008, 2010, 2011a, 2011b; Camilli, et al., 2010; Pianta, et al., 2012; Reynolds, et al., 2001, 2011; Reynolds and Temple, 2006, 2008; Schweinhart et al., 2005). These longitudinal studies show that students from lower income backgrounds who experience a high-quality, full-day preschool program perform better in learning basic skills in elementary school, score higher on academic goals in middle and high school, attend college at a greater rate, and as adults, earn higher incomes and engage in less socially-undesirable behavior.

In specifying more specific positive impacts, Lynch (2007) and a more recent report from the Education Commission of the States (Workman, Griffith & Atchison, 2014) identify the multiple benefits of preschool programs for children who participate in high-quality preschool programs:

- Require less special education;
- Are less likely to repeat a grade;
- Are less likely to need child welfare services;
- Enroll in K-12 education better prepared resulting in lower spending on extra help services;
- Are less likely to engage in criminal activity as juveniles and adults;
- Are less likely to need social welfare support services as adults;
- Have higher incomes, generally, when they enter the labor force;
- Pay higher taxes as a result of their higher incomes; and
- Are likely to have employer-provided health insurance.

The consistent and recurring theme in the analyses is the multiple benefits and long-term savings accrue to high-quality preschool programs. Although a high-quality program is defined to a large extent by the individuals employed to run the program and their commitment to their job, as well as a comprehensive array of services beyond the school component, it is possible to identify the components needed to support high-quality programs.

Russo (2007) identified the components of high-quality, effective PreK-3 programs as:

1. Voluntary, full-day preschool-kindergarten available to all three-and four-year-old children.
2. Full-day kindergarten that builds on preschool experiences and is available to all children, which is supported by the current Legislative Model.
3. Standards, curriculum, instruction, and assessments aligned within and across grades from preschool through grade three, which can be accomplished with new curriculum standards.
4. Curriculum focused on emotional development, social skills, and self-discipline, as well as reading and mathematics.

5. Early education lead teachers qualified to teach any grade level from preschool through grade three and compensated based on public elementary school teacher salaries.
6. Families and teachers who work together to ensure the success of all children.

In 2010 the National Institute for Early Education Research (NIEER) established 10 quality benchmarks to identify program quality, and modified them in 2017 to make them consistent with more recent research.<sup>2</sup> The slightly revised and enhanced standards listed below are similar to the previous standards and track closely to the elements of the EB model. The new standards include:

- Comprehensive early learning development standards that are horizontally and vertically aligned with K-3 curriculum standards and programs;
- Support for curriculum implementation;
- Teachers with a bachelor's degree;
- Teachers with specialized training in early childhood;
- Assistant teachers with a Child Development Associate credential or the equivalent;
- Teacher in-service training of at least 15 hours per year, with coaching for both teachers and assistant teachers;
- Class sizes of 20 or fewer students;
- Staff to child ratios of 1:10 or better;
- Vision, hearing and health screening and referral and support services; and
- Continuous quality improvement systems.

For many years, nearly all of the longitudinal, randomized controlled studies of preschool programs have relied on data from three preschool programs that met the above standards: High-Scope Perry Preschool Program, Carolina Abecedarian Project, and the Chicago Child-Parent Center Program. These results reinforce the finding that the most robust impacts of preschool programs are those that emerged from studies of the effect of high-quality programs.

In sum, these studies found that a high-quality preschool program, offered for a full day and taught by fully certified and trained teachers using a rigorous, but appropriate early childhood curriculum, can provide initial positive effects and even greater effects in later primary years. By themselves, preschool programs can reduce achievement gaps linked to race and income by half. And the effect of preschool programs can be enhanced if followed by high-quality education programming in the elementary grades, particularly grades K-3.

Today, there is increasing recognition that preschool should be provided for *all students*. Recent research shows that this strategy produces significant gains for children from middle class backgrounds and even larger impacts for students from lower income backgrounds (Barnett, Brown & Shore, 2004).

Impact of Statewide Preschool Programs. Researchers have also analyzed the success of larger, more universal, i.e., statewide, preschool initiatives. A 2003 study of state-funded preschool programs in six states – California, Georgia, Illinois, Kentucky, New York, and Ohio – found that children from lower

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<sup>2</sup> See [http://nieer.org/wp-content/uploads/2017/05/YB2016\\_StateofPreschool2.pdf](http://nieer.org/wp-content/uploads/2017/05/YB2016_StateofPreschool2.pdf) pp 14-17 for a detailed description of the NIEER quality standards.

income families start catching up to their middle-income peers when they attend a preschool program (Jacobson, 2003). There is evidence that statewide universal programs in Georgia (Henry, et. al. 2006), and Oklahoma (Gromley, Jr. et. al. 2005) have improved the performance of students who participated in those programs. In addition, a 2007 study showed that preschool programs in New Jersey's urban districts had not only significant short-term cognitive and social impacts, but also long term, positive impacts on students who enrolled in them, closing the achievement gap by 40% in second grade for a two-year preschool program (Frede, Jung, Barnett et al., 2007).

More recent analyses of state preschool programs show that although preschool effects might appear to dissipate by grade three, they have longer-term positive impacts. Two recent studies of a more "universal" preschool program in Tulsa, Oklahoma, found that a high-quality Head Start program had clear short-term impacts which, tended to dissipate (though not completely and not for all children) by grade three. But the program produced significant positive impacts on participating students several years later in their middle school years (Hill, et al., 2015; Phillips et al., 2016), especially for low income and minority children. The authors argued that the grade three "fade" phenomenon, while troublesome, is muted by longer term impacts by the time children who participated in the program reached middle school. This suggests evidence that high-quality preschool programs do produce longer term, sustainable results.

Fiscal Returns to Preschool. Generally, estimates of the long-term financial benefits of preschool programs are reported as returns on investment. Reynolds and Temple (2008) reported that in addition to benefits to child well-being and student achievement, high-quality preschool programs for low-income children at-risk for underachievement produced economic returns ranging from four dollars to \$10 per dollar invested. Others make similar arguments. Several studies conclude that there is a return over time of eight to 10 dollars for every one dollar invested in high-quality preschool programs (Barnett, 2007; Barnett & Masse, 2007; Barnett & Frede, 2017; Karoly et al., 1998; Reynolds et al., 2011; Zigler, Gilliam & Jones, 2006; and Gromley, 2007).

In a more detailed analysis, Lynch (2007) found that voluntary, high-quality, publicly funded preschool programs targeted to the poorest 25 percent of three-and four-year old children generate substantial benefits that would eclipse the costs of the programs in six years. By 2050, Lynch estimated that the annual benefits of these preschool programs would exceed the program costs in that year by a ratio of 12.1:1. He estimated the cost of a high-quality half-day program at \$6,300 (2006 dollars) for each of the 2 million children enrolled. He further estimated that if programs were funded by individual states (rather than the Federal Government), by 2050, all 50 states would realize net benefits in tax revenues from the programs in between four and 29 years.

Lynch (2007) estimated that if a voluntary, high-quality publicly funded universal half-day preschool program for three-and four-year-olds were established, budgetary savings would surpass costs in about nine years and by 2050, benefits would exceed costs by an 8.2:1 ratio. He assumed these preschool programs would also cost approximately \$6,300 (2006 dollars) per student and when fully phased in would enroll approximately seven million children.

The Case for Integrated PreK-3 Programs. The discussion above addressed preschool programs, but said little about PreK-3 programs or their benefits. While there is growing evidence that integrating preschool programs with primary grades can lead to increased educational benefits, this field has not been explored

as extensively. Takinishi (2016) is an exception, and as noted above, the National Institute on Early Education Research now includes integration of preschool with the K-3 program as a core program quality standard.

Takanishi and Kauerz (2008) and more recently Takanishi (2016) argue that the PreK-3 years are the cornerstone of any educational system, and point out the importance of quality integrated PreK-3 programs in providing strong foundations for lifelong learning, educational excellence, and competitiveness in the marketplace. Bogard (2003) suggests that variability in preschool experiences is a strong predictor of children performance, and the link is even stronger for low-income children. She suggests that a PreK-3 approach to early childhood education will help to level the playing field by supporting better teacher preparation and qualifications, as well as establishing sequential learning experiences.

One of the challenges is coordinating traditional education programs with PreK-3 programs. First, the need to coordinate education programs (curriculum, professional development, teacher collaboration, school facilities) becomes more complex with the addition of more staff, students, and grade levels. An efficient way to help such coordination is to make preschool teachers part of a PreK-3 teacher collaborative team. Second, many preschool programs are offered by providers other than the public school system – frequently at sites other than the local school. Finally, coordinating preschool with the regular K-3 program is further complicated by the fact that in the foreseeable future, preschool programs will remain voluntary. This means some children will continue to come to kindergarten without the benefit of preschool programs, and other children who have had access to preschool programs will bring very different experiences to the first years of formal schooling. The success of a PreK-3 program also depends on the quality of the educational program in grades K-3, which varies across schools, school districts and even states. This issue would be mitigated with adequate funding for all Michigan schools. This study addresses that issue by using our EB Model to estimate the resources needed for a high-quality program in all PreK-3 classrooms, with the K-3 programs addressed below in the discussion of adequate EB resources for grades K-3.

Many of the components of success for high-quality preschool programs are also part of the components advocated by PreK-3 supporters. These include full-day Pre-K programs with low pupil/teacher ratios staffed by highly qualified teachers and aides, along with support for articulating curriculum, professional development, teacher collaboration and educating children with special educational needs.

In earlier research, Picus, Odden and Goetz (2009), as part of an overall effort to estimate costs for PreK-3 programs nationwide, developed case studies of several integrated preschool programs. The case studies showed that such programs were provided in regular elementary school settings; often organized schools into PreK-1, grades two through three, and grades four through five collegial teacher teams; provided preschool teachers with the same pupil-free time as the grade level elementary teachers so they could all meet during the regular school day for collaborative planning; integrated the preschool through grade one curriculum; and generally augmented a K-5 elementary school with an additional one to three preschool classrooms. Most of the preschool classrooms were staffed with one teacher and one aide for every 15-20 students.

In addition, and as recommended by the NIEER standards, preschool programs had classroom teachers that were fully certified as early childhood educators and paid on the same salary schedule as the other teachers in the school district. It should be expected that many of the components of a high-quality preschool program are part of the K-3 programs provided by the EB Model. As stated above, preschool impact is linked to quality and quality includes both a set of programs and strategies and the staff to implement them (Camilli, et al., 2010; Whitebrook, 2004). Program quality is particularly significant for males. Garcia, Heckman, Leaf & Prados (2016) write in a recent paper that males placed in relatively low-quality childcare centers experience far more negative consequences than females, which suggests that high program quality is necessary to generate quality outcomes.

Including preschool students in a district's pupil count for state aid purposes and including preschool teachers on the same salary schedule as teachers of other grades is the most straight-forward way to fund high-quality preschool programs.

The EB Method to Providing Integrated Preschool Programs. The EB method has been used to identify costs for integrated preschool programs in three recent studies. The first was a study Picus Odden & Associates conducted for The Fund for Child Development, that developed estimated costs for providing PreK-3 programs, in all 50 states and the District of Columbia (Picus, Odden & Goetz, 2009). The study estimated Pre-K-3 program costs for each state using varying assumptions of student eligibility and participation. The second was a study conducted in 2011 as part of an adequacy study for Texas (Picus, Odden, Goetz & Aportela, 2012). The third was an analysis conducted for Maine as part of a 2013 recalibration of its adequacy-oriented school funding system (Picus et al., 2013).

In these three studies, the EB Model was used to develop a per preschool pupil cost for a high-quality preschool program by identifying the elements for a high-quality preschool program. The per student cost figure was derived from a prototypical preschool program of 150 students, which included 10 classrooms of 15 students each. The preschool EB Model provides core, elective and substitute teachers. Additional personnel resources include an assistant principal position to provide a preschool program coordinator, instructional coaches, pupil support, special education teachers for students with mild and moderate disabilities, instructional aides, special education aides, nurses and secretaries. Non-personnel resources are provided for technology and equipment, instructional materials, professional development, and assessments. The EB Model also includes central office costs for central administration and operation and maintenance.

Alternatively, the State could provide a preschool program as part of the EB Model and simply add preschool student counts to those of every elementary school. By doing this and staffing the preschool grades with one teacher and one instructional aide for every 15 preschool students, an estimate of the costs of providing preschool would be included in the costs of the EB Model. Our report provides a separate per student figure for students aged three and four in an EB Model resourced preschool program.

## 1b. Full-Day Kindergarten

The EB model provides for a full-day kindergarten program.

Model Element	2016 Evidence-Based Recommendation
1b. Full-day kindergarten	Full-day kindergarten program. Each K student counts as 1.0 pupil in the funding system.

### Analysis and Evidence

Research shows that full-day kindergarten for students age five, particularly for such students from low-income backgrounds, has significant, positive effects on student learning in the early elementary grades (Gullo, 2000; Slavin, Karweit & Wasik, 1994). Fusaro’s (1997) late 1990s meta-analysis of 23 studies comparing the achievement effect of full-day kindergarten to half-day kindergarten programs, found an average effect size of +0.77, which is substantial.<sup>3</sup> Children participating in full-day kindergarten programs do better in learning the basic skills of reading, writing, and mathematics in the primary grades than children who receive only a half-day program or no kindergarten at all (see also Lee, Burkam, Ready, Honigman & Meisels, 2006).

In 2003, using nationally-representative, longitudinal data from the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS–K), Denton, West & Walston (2003) showed 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. Cooper, et al.’s (2010) comprehensive meta-analysis reached similar conclusions finding the average effect size of students in full-day versus half-day kindergarten to be +0.25. Moreover, a randomized controlled trial found the effect of full-day versus half-day kindergarten to be about +0.75 standard deviations (Elicker & Mathur, 1997). As a result of this research, funding full-day kindergarten for five-year-olds is an increasingly common practice among the states (Kauerz, 2005). Since research suggests children from all backgrounds can benefit from full-day kindergarten programs, the EB Model supports a full-day kindergarten program for all students.

## 2. Elementary Core Teachers/Class Size

In staffing schools and classrooms, the most expensive decision superintendents and principals make is that of class size. Core teachers are defined as the grade-level classroom teachers in elementary schools. In middle and high schools, core teachers are those who teach core subjects such as mathematics, science, language arts, social studies and world languages. Advanced Placement (AP) or International Baccalaureate (IB) classes in these subjects are considered core classes.

Model Element	2016 Evidence-Based Recommendation
2. Core Teachers/Class Size	Grades K-3: 15 (Average class size of 17.3) Grades 4-5/6: 25

<sup>3</sup> 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 do not. An effect size of 1.0 indicates that the average student’s performance would move from the 50<sup>th</sup> to the 83<sup>rd</sup> percentile. The research field generally recognizes effect sizes greater than 0.25 as significant and greater than 0.50 as substantial.

## Analysis and Evidence

The gold standard of educational research is randomized controlled trials, which provide scientific evidence on the impact of a certain treatment (Mosteller, 1995). In that vein, the primary evidence on the impact of small classes today is the Tennessee STAR study, which was a large scale, randomized controlled experiment of class sizes of approximately 15 students compared to a control group of classes with approximately 24 students in kindergarten through grade three (Finn and Achilles, 1999; Word, et al., 1990). The study found 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 the impacts were even larger (effect size of about 0.50) for low income and minority students (Finn, 2002; Grissmer, 1999; Krueger, 2002). The same research also showed a regular class of 24 to 25 students with a teacher and an instructional aide *did not* produce a discernible positive impact on student achievement, a finding that undercuts proposals and wide spread practices that place instructional aides in elementary classrooms (Gerber, Finn, Achilles, & Boyd-Zaharias, 2001).

Subsequent research showed the positive impacts of the small classes in the Tennessee study persisted into middle and high school years, and the years beyond high school (Finn, Gerber, Achilles & J.B. Zaharias, 2001; Konstantopoulos & Chung, 2009; Krueger, 2002; Mishel & Rothstein, 2002; Nye, Hedges & Konstantopoulos, 2001a, 2001b). Longitudinal research on class size reduction also found the lasting benefits of small classes include a reduction in the achievement gap in reading and mathematics in later grades (Krueger & Whitmore, 2001).

Although some argue the impact of the small class sizes is derived primarily from kindergarten and grade one that was not the experimental treatment. Further, Konstantopoulos and Chung (2009) found the longer students were in small classes (i.e., in grades K, one, two, and three) the greater the impact on grade 4-8 achievement. They concluded the full treatment – small classes in all of the first four grades – had the greatest short and long-term impacts.

Though differences in analytic methods and conclusions characterize some of the debate over class size (see Hanushek, 2002 and Krueger, 2002), the EB model reflects those concluding class size makes a difference, but only class sizes of approximately 15 students with one teacher (and not class sizes of 30 with an aide or two teachers) and only for kindergarten through grade three.

Finally, in these times when funds for schools are scarce, it is legitimate to raise the issue of the cost of small classes versus the benefits. Whitehurst and Chingos (2011) argue that though the Tennessee STAR study supports the efficacy of small classes, there is other research today that produced more ambiguous conclusions. However, they also note the other research includes class size reductions in grades above K-3 and “natural experiments” rather than randomized controlled trials. Most importantly, they also conclude that while the costs of small classes are high, the benefits, particularly the long-term benefits, outweigh the costs and conclude small class sizes in grades K-3 “pay their way.”

The study team consistently recommend states fund all other elements of the EB Model before putting funds into smaller class sizes because research shows many other components of the EB Model are more cost effective in terms of improving student performance – particularly for improving the performance of struggling students.

### *A Note on the Difference Between Class Size and Staffing Ratios*

As is discussed next, the EB model provides more than just core teachers; it also provides elective teachers. The model calculates the total number of instructional teachers by using class size. But some state formulas use staffing ratios, not class size, as a term that includes both core and elective teacher (these terms are defined below) while the EB model determines the number of core and elective teachers separately and determined by class size. Thus “class size” and “staffing ratios” are two terms that have different meanings. Despite the important difference between these two terms, there has been misunderstanding about class size and staffing ratios and how many total teaching resources are generated by each. The purpose of this discussion is to clarify the terms “staffing ratios” and “class size,” and explain the differences between the two.

The first step is to define the phrase “class size” and the phrase “staffing ratio.” Understanding the distinction between the two is critical to understanding the differences in the number of teachers in the EB staffing model versus other state’s staffing models.

1. *Class Size:* In the EB Model, class size is used to determine the number of core teachers in each school. The number of core teachers is then used to determine the number of elective teachers, which is specified as a percent of core teachers. The total number of teachers who provide classroom instruction at any school is the sum of the core and elective teachers.
2. *Staffing Ratio:* Once the number of core and elective teachers is calculated, a staffing ratio can be determined by dividing the total number of (core and elective) teachers into the number of students in the school. Although the staffing ratio is not used in the EB model, it is used in some states to generate the number of teachers in each prototypical school, and is a common term used among both legislators and educators.

The second step is to show how class size and staffing ratios can be equivalently compared. Take a school of 500 students. Suppose core teachers would be staffed at class sizes of 25. This would produce 20 teachers (500 divided by 25). If the school had a six-period schedule and teachers provided instruction for five of those periods, then additional or elective teachers would be provided at the rate of 20 percent of core teachers, or an additional four teachers (20 percent times 20). This would produce a total of 24 teachers, 20 core and four elective teachers. A staffing ratio that produces the equivalent number of teachers would be determined by dividing 24 into 500, which equals 20.83. The result is a staffing ratio of 20.83 which is equivalent to providing core teachers and elective teachers for class sizes of 25.

A staffing ratio of 20.83 should not be interpreted as providing class sizes of 21 (20.83 rounded to the nearest whole number). Staffing ratios are correctly used to determine the total number of teachers provided. In a school of 500, a staffing ratio of 20.83 provides 24 total teachers (500 divided by 20.83). That total then needs to be segmented into core teachers and elective teachers, which would be 20 and four respectively, in the example above, with class sizes of 25, not 21.



### 3. Secondary Core Teachers/Class Size

In middle and high schools, core teachers are those who teach core subjects such as mathematics, science, language arts, social studies, and world languages. AP and IB classes in these subjects are considered core classes.

Model Element	2016 Evidence-Based Recommendation
3. Secondary Core Teachers/Class Size	Grades 6-12: 25 (Average Class Size of 25)

#### Analysis and Evidence

There is less research evidence on the most effective class sizes in grades four through 12 than there is on effective class sizes in grades K-3. As a result, in developing the EB Model, the study team sought evidence on the most appropriate secondary class size from typical and best practices to identify the most appropriate class size for these grades. The national average class size in middle and high schools is roughly 25 students, and nearly all the late 20<sup>th</sup> century comprehensive school reform models were developed on the basis of a class size of 25 students (Odden, 1997; Stringfield, Ross & Smith, 1996) a conclusion on class size reached by the dozens of experts who created these whole-school design models. Although many professional judgment panels in several states have recommended secondary class sizes of 20, none cited research or best practices to support that proposal.

Citing more recent studies, Whitehurst and Chingos (2011) argue there might be a modest linear relationship in improving student performance when class size drops from between 25 and 30 students to 15, but our view of the evidence and impact is that the gains identified are modest at best, and insufficient to alter the EB Model class size recommendations.

The EB model includes core class sizes of 25 for grades 4-12.

### 4. Elective/Specialist Teachers

In addition to core classroom teachers, the EB Model provides elective or specialist teachers to support core teachers. Generally, non-core or elective teachers, also called specialist teachers, offer courses in subjects such as music, band, art, physical education, health, career-technical education, etc. A combination of core and elective teachers has two purposes. The first is to allow schools to offer a full, liberal arts curriculum program with adequate courses outside the core. The second is that it provides time during the school day for all teachers to collaborate on instructional plans, participate in professional development activities and otherwise plan for class instruction.

Model Element	2016 Evidence-Based Recommendation
4. Elective/Specialist Teachers	Elementary Schools: 20% of core elementary teachers
	Middle Schools: 20% of core middle school teachers
	High Schools: 33 1/3% of core high school teachers

## Analysis and Evidence

In addition to the core subjects addressed above, schools need to provide a solid well-rounded curriculum including art, music, library skills, career/technical and physical education. The April 2017 issue of *Phi Delta Kappan* discusses many issues related to the importance of art and music for our public schools. Relatedly, teachers also need some time during the regular school day to work collaboratively and engage in job-embedded professional development. Providing every teacher one period a day for collaborative planning and focused professional development requires an additional 20% allocation for elective teachers. Using this elective staff allocation, every teacher – core and elective – would teach five of six periods during the day, and have one period for planning, preparation, and collaborative work. One of the most important elements of effective collaborative work is team-focused data-based decision making, using student data to improve instructional practices, shown to be effective by a recent *randomized controlled trial* (Carlson, Borman & Robinson, 2011).

When teachers work in collaborative teams, they review student data to design standards-based lesson plans and curriculum units, identify interventions for struggling students and monitor all student progress toward meeting performance standards. Research supports the importance of teacher collaborative work. As noted previously in the section on the high-performance school embedded in the EB model, collaborative teacher teams are key ingredients in schools producing large gains in student performance and significant reductions in achievement gaps for at-risk students. Ronfeldt et al. (2015) found that teachers working in collaborative groups boosted student learning over a two-year period in the Miami-Dade school district. Using a data base similar to the Miami-Dade data base, Sun, Loeb and Grissom (2017) found that when a more effective teacher becomes part of a teaching team, the performance of other teachers improves and the performance of the more effective teacher does not drop. This finding suggests that teacher collaboration can be enhanced when the system strategically ensures that each teacher team has a highly effective teacher as a member. Economists Jackson, and Bruegmann (2009), calling teacher collaboration “peer learning,” also found that such activities were related to student learning gains. Jensen (2014) shows how integrating “professional learning” into the lives of teachers is a core element of high performing schools in Australia. Johnson, Reinhorn & Simon (2016) found that six high-poverty schools in one urban district that had achieved the highest state rating, made teacher teams the central component of their schoolwide improvement strategies and that a key condition was ensuring that the school schedule provided regular, reliable meeting times for teams. Berry (2015-16) synthesizes several studies of how teacher collaborative work is linked to student learning in many U.S. schools and Boudett and Steele (2007) provide several examples of how data-based decision making can be organized in schools.

This research supports the EB model strategy of including both core and elective teachers, making it possible for schools to offer a full liberal arts curriculum and enable all teachers to engage in collaborative work with their peers.

The 20 percent additional staff is adequate for elementary and middle schools, but the EB Model establishes a different argument for high schools. If the goal is to have more high school students take a core set of rigorous academic courses, and learn the course material at a high level of thinking and problem solving, cognitive research findings suggest that use of longer class periods, such as a block schedule, can be a better way to organize the instructional time of a high school. (Bransford, Brown and Cocking, 1999; Donovan & Bransford, 2005a, 2005b, 2005c). Typical block scheduling for high schools

includes four 90-minute blocks where teachers provide instruction for three of those 90-minute blocks and have one block – or 90 minutes – for planning, preparation, and collaboration each day. This schedule requires elective teachers at a rate of 33 1/3 percent of the number of core teachers. This block schedule would operate with students taking four courses each semester attending the same classes each day, or with students taking eight courses each semester while attending different classes every other day. Such a schedule could also entail a few “skinny” blocks (45 minute periods) for some classes. Each of these specific ways of structuring a block schedule, however, would require an additional 33 1/3 percent of the number of core teachers to serve as elective teachers to provide the regular teacher with a “block” for planning, preparation, and collaboration each day.

It should be noted that staffing recommendation for high schools would be sufficient for high schools to provide all students with a rigorous set of courses throughout grades 9-12, such as Michigan’s merit curriculum. It also allows schools to provide the appropriate number of credits required for high school graduation to qualify for scholarships and be college ready for virtually any post-secondary institution in the country, including Michigan’s high school graduation requirements.

The elective teacher recommendation described above does not provide sufficient resources, at the same class sizes, for either middle schools or high schools to offer a seven-period day and have teachers instruct for only five of those periods. The EB Model does not resource schools at that level for two primary reasons. First, the EB Model formulates recommendations on strategies and resources to dramatically improve student performance in the core subjects of mathematics, reading/English/language arts, science, history/geography, and world languages, in part by providing nearly an hour of instruction in each of these subjects daily. Restructuring the day to add a seventh period is usually accomplished by dividing the six hours of instruction by seven rather than six, therefore reducing the minutes of instruction in core subjects; this is not a strategy that is likely to boost performance in those subjects, regardless of the arguments about the motivational aspects of elective classes. Second, increasing the provision of specialist and elective teachers to 40 percent in both middle and high schools is costlier. Therefore, a recommendation of 40 percent specialists and elective teachers in both middle and high schools would result in added costs and a potential decrease in instructional effectiveness for the core subjects, something that is not aligned with the framework for the EB approach to adequacy.

#### *Additional Comments on Scheduling Time for Teacher Collaboration*

Collaborative teacher work in Professional Learning Communities (PLCs) is critical to a school’s success. During focus groups with teachers in four states over the past two years, nearly all teachers have stated that PLCs – or collaborative teacher teams – were core and critical elements of their success in producing student learning gains, aligning their practices with research.

In order for schools to create such work teams, pupil-free time must be available during the school day. Creating collaborative time and then scheduling teachers in each team for common pupil-free time is enabled by having a combination of elective and core teachers. In our work in other states, teachers shared many different approaches to using time for planning and collaboration. The EB recommendations of providing at least 60 minutes of pupil-free time for elementary middle teachers, and 90 minutes for high school teachers has generally been viewed as adequate for carving out collaborative time. However, even when the funding model provides for such time, too often schools do not provide for that pupil-free time, or when they do, do not have teachers using most of it for collaborative team work – a key to

boosting student learning. Stakeholder focus groups noted considerable differences in how strongly teachers were encouraged or required to use pupil-free time for collaborative teacher work versus individual planning and preparation.

Moreover, many middle and high schools organize the schedule for a seven-period day with teachers providing instruction for five periods. As compared to the EB Model, this requires 40 percent elective teachers over core teachers, not the 20 percent for middle schools and 33.33 percent for high schools in the EB Model. This approach either requires larger class sizes or local districts to raise funds above the adequacy level to cover the additional costs.

At the same time, school districts around the country increasingly require a seven-and-a-half-hour work day for teachers. Instruction usually comprises six hours of this time, and lunch 30 minutes, leaving 60 minutes for student arrival and departure and possible teacher collaborative time. A seven-hour teacher day together with the core and elective provisions of the EB model provide ample resources for districts and schools to provide time for teacher collaborative teams to meet regularly and often during the regular school day.

A reasonable goal for a funding formula, and for organizing schools to provide both instructional and collaborative time, is to create three to five pupil-free time periods a week to allow teachers to engage in collaborative teacher work. As noted above, the EB Model provides resources to allow this to happen, especially with a seven-and-a-half-hour work day.

The EB model provides elective teachers at the rate of 20 percent of the number of core elementary and middle school teachers, and 33.33 percent of core secondary teachers, for average elective class sizes of 25. This provision ensures all schools can provide a full liberal arts curriculum and schedule sufficient time for all teachers to meet several times a week in collaborative, teacher data teams.

### **5. Instructional Facilitators/Coaches**

Instructional coaches, or instructional facilitators, coordinate the instructional program but most importantly provide the critical ongoing instructional coaching and mentoring the professional development literature shows is necessary for teachers to improve their instructional practice (Cornett & Knight, 2008; Crow, 2011; Garet, Porter, Desimone, Birman, & Yoon, 2001; Joyce & Calhoun, 1996; Joyce & Showers, 2002). This means that instructional coaches spend the bulk of their time with teachers, modeling lessons, giving feedback to teachers, helping teachers analyze student data for its instructional implications, working with teacher collaborative teams, and generally helping to improve the instructional program. The few instructional coaches who also function as school technology coordinators provide the technological expertise to fix small problems with the computer system, install software, connect computer equipment so it can be used for both instructional and management purposes, and provide professional development to embed computer technologies into a school’s curriculum. This report expands on the rationale for these individuals in the section on professional development (Element 14), but includes them here as they represent teacher positions.

<b>Model Element</b>	<b>2016 Evidence-Based Recommendation</b>
5. Instructional Coaches/Facilitators	1.0 Instructional coach position for every 200 students

## Analysis and Evidence

A few states (i.e., Arkansas, New Jersey, Wyoming and to a modest degree North Dakota) explicitly provide resources for school and classroom-based instructional coaches. Most comprehensive school designs (see Odden, 1997; Stringfield, Ross & Smith, 1996), and EB studies conducted in other states – Arizona, Arkansas, Kentucky, Maine, Maryland, North Dakota, Washington and Wisconsin – call for school-based instructional coaches.

Early research found strong effect sizes (1.25-2.71) for coaches as part of professional development (Joyce & Calhoun, 1996; Joyce & Showers, 2002). Several years later, Sailors and Price (2010) found that professional development combined with coaching increased the deployment of comprehensive instructional practices by between 0.64 and 0.78 SD, and Newmann and Cunningham (2009) found a similar impact on teachers' instructional impact as well as improved reading achievement by about 0.2 standard deviations. A 2010 evaluation of a Florida program that provided reading coaches for middle schools found positive impacts on student performance in reading (Lockwood, McCombs & Marsh, 2010). A related study found that coaches provided as part of a data-based decision-making initiative also improved both teachers' instructional practice and student achievement (Marsh, McCombs & Martorell, 2010). A study published two years later came to the same conclusions about coaching as part of improving reading (Coburn & Woulfin, (2012).

Positive impacts of coaching are not limited to reading instruction and achievement. Campbell and Malkus (2011) found that the combination of professional development and two years of coaching also changed teachers' instructional practice and increased students' mathematics achievement by about 0.2 standard deviations.

More importantly, a randomized controlled trial of coaching (Pianta, Allen & King, 2011) found significant, positive impacts in the form of student achievement gains across four subject areas – mathematics, science, history, and language arts. This research provides further support for this element as an effective strategy to change teachers' instructional practice and boost student learning.

Domina et al. (2015) documented the increase in the number of instructional coaches in school districts around the country. They found that the number of instructional specialists per 1000 students doubled from 1998-2013 (from about 0.7 to 1.4) and that the percent of districts with no such staff declined from 20 percent to seven percent. In addition, Cobb and Jackson (2011) argue that instructional coaches are key to improving instructional practice at scale, particularly in mathematics.

In terms of numbers of coaches, several comprehensive school designs suggest that although one instructional coach might be sufficient for the first year of implementation of a new curriculum program, additional instructional coaches are needed in subsequent years as the curriculum in more subjects is modified – something that is happening in Michigan and most other states to implement a more rigorous curriculum designed to have all students be college and career ready. Moreover, several technology-heavy school designs recommend a full-time instructional facilitator who spends at least half of their time as the site's technology expert.

Drawing from all programs, the study team concludes that one FTE instructional coaches are needed for every 200 students in a school. This resourcing strategy works for elementary as well as middle and high schools. For the prototypical schools, this recommendation equates to 2.25 instructional coach positions

for each prototypical elementary and middle schools (450 students) and three instructional coach positions for the prototypical high school (600 students).

Although instructional coaching positions are identified as FTE positions, schools could divide the responsibilities across several individual teachers. For example, the three positions in a 600-student high school could be structured with six half-time teachers and instructional coaches. In this example, each teacher/coach would work 50 percent time as a coach – perhaps in one curriculum area such as reading, math, science, social studies, and technology – and 50 percent time as a classroom teacher or tutor.

This level of staffing for instructional coaches, combined with the additional elements of professional development discussed below, focuses on making Tier 1 instruction (in the RTI framework) as effective as possible, providing a solid foundation of high-quality instruction for everyone, including students who struggle more to learn to proficiency, and students with disabilities.

### 6. Core Tutors/Tier 2 Intervention

The most powerful and effective approach for helping students struggling to meet state standards is individual one-to-one or small group (1:3 or 1:5 maximum) tutoring provided by licensed teachers (Shanahan, 1998; Wasik & Slavin, 1993). Earlier EB reports recommended allocation of tutors to schools on the basis of the number of poverty and ELL students, with no minimum tutor positions. Since then, and particularly with the onset of more rigorous college and career ready curriculum standards, the study team has concluded that all schools, even those with no or very few poverty or ELL students, will still have some struggling students that need Tier 2 resources. Thus, the EB Model has been enhanced to provide each prototypical school with at least one *core* tutor position as well as the additional tutor/Tier 2 Interventionist positions based on poverty and ELL student counts (Element 22 and 26).

Model Element	2016 Evidence-Based Recommendation
6. Core Tutors/Tier 2 Intervention	One tutor position in each prototypical school (Additional tutors are enabled through the at-risk pupil and ELL counts in Elements 22 and 26)

#### Analysis and Evidence

The most powerful and effective extra help strategy to enable struggling students to meet rigorous performance standards is individual one-to-one tutoring provided by licensed teachers (Shanahan, 1998; Wasik & Slavin, 1993). Students who must work harder and need more assistance to achieve to proficiency levels 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 (Cohen, Kulik & Kulik, 1982; Shanahan, 1998; Shanahan & Barr, 1995; Wasik & Slavin, 1993) with an average of about 0.75 (Wasik & Slavin, 1993). The most recent meta-analysis of the impact of intelligent, or computer-based, tutoring found that the average effect size was 0.66 across multiple subjects, which increases student performance from the 50<sup>th</sup> to the 75<sup>th</sup> percentile (Kulik & Fletcher, 2016), though the effect varied by type of tutoring. Finally, the most recent meta-analysis of the impact of tutoring found similarly high effects (Dietrichson, Bog, Filges, & Jorgensen, 2017).

The impact of tutoring programs depends on how they are staffed and organized, their relation to the core program, and tutoring intensity. Researchers (Cohen, Kulik, & Kulik, 1982; Farkas, 1998; Shanahan, 1998; Wasik & Slavin, 1993) and experts on tutoring practices (Gordon, 2009) have found greater effects when the tutoring includes the following:

- 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 for the tutoring; and
- Highly structured programming, both substantively and organizationally.

Please note several specific structural features of effective one-to-one tutoring programs:

1. 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 of their time tutoring; but a one FTE tutoring position would allow 18 students per day to receive 1:1 tutoring.). Four positions would allow 72 students to receive individual tutoring daily.
2. Most students do not require tutoring all year long; tutoring programs generally assess students quarterly and change tutoring arrangements. With modest changes, close to half the student body of a 400-student school could receive individual tutoring during the year.
3. Not all students who are from a low-income background require individual tutoring, so a portion of the allocation could be used for students in the school who might not be from a lower income family, but nevertheless have a learning issue that could be remedied by tutoring. This also is part of the rationale for including one tutor in each prototypical school, regardless of the number of at-risk students.

Though this discussion focuses on *individual* tutoring, schools could also deploy these resources for small group 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 (all Tier 2 interventions) 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 at or below the 20<sup>th</sup> or 25<sup>th</sup> percentile on a norm referenced test, or at the below basic level on state assessments. Intensive instruction for groups of three-to-five students would then be provided for students above those levels but below the proficiency level.

It is important to note that the instruction for all student groups needing extra help needs to be more explicit and sequenced than that for other students (Honig, 1996). 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 construct meaning.

Torgeson (2004) goes on to state that meta-analyses consistently show the positive effects of reducing reading group size (Elbaum, Vaughn, Hughes & Moody, 1999) and identifies experiments with both one-to-three and one-to-five teacher-student groupings. Though 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.

For example, if the recommended numbers of tutors are used for such small groups, one reading position could teach 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. Four tutoring positions could then provide this type of intensive instruction for up to 120 students daily. In short, though, one to one tutoring, and some students need one to one tutoring, other small group practices (which characterize the bulk of Tier 2 interventions) can also work, with the length of instruction for the small group increasing as the size of the group increases.

Though Torgeson (2004) states similar interventions can work with middle and high school students, the effect often 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. However, a new randomized control study, (Cook et al., 2014) discussed next, found similarly positive impacts of a tutoring program for adolescents in high poverty schools if it was combined with counseling as well. This is made possible in the EB Model as it includes such additional non-academic pupil support resources (see Element 27 discussion). Nevertheless, Torgeson is also viewed as a key individual encouraging practitioners and policymakers to address reading interventions for secondary students, because until the 1980s most reading research and interventions were developed for grades K-3. Since then, several effective secondary reading interventions have been developed (Scammacca, Roberts, Vaughn & Stuebing, 2015) and should be considered by schools as the resources to deploy them are included in the EB funding model.



The rationale outlined above is strengthened by two recent randomized controlled trials of the effectiveness of tutoring for struggling students, which support the EB’s logic of providing a minimum level of tutor support in all schools as well as additional tutors for schools with greater need. At the elementary level, May et al., (2016), using a randomized controlled trial, assessed the impact of tutors in a Reading Recovery program. Reading Recovery is a short-term intervention that provides one-on-one tutoring to first-grade students who are struggling in reading. The supplementary program aims to promote literacy skills and foster the development of reading strategies by tailoring individualized lessons to each student. As part of the scale-up, the 3,747 teachers trained in Reading Recovery with Federal I3 grant funds provided one-to-one Reading Recovery lessons to 62,000 students and taught an additional 325,000 students in other instructional settings.

The evaluation included a four-year, multi-site randomized control trial (RCT) involving nearly 7,000 first-grade students in more than 1,200 schools. Students who participated in Reading Recovery significantly outperformed students in the control group on measures of overall reading, reading comprehension, and decoding. These effects were similarly large for English language learners and students attending rural schools, which were the student subgroups of priority interest for the i3 scale-up grant program.

The RCT revealed medium to large impacts across all outcome measures. Effect sizes on the Iowa Test of Basic Skills (ITBS) Reading Total assessment and its Comprehension and Reading Words subscales at the end of 12 to 20 weeks of treatment ranged from 0.30 and 0.48 standard deviations. For the ITBS Total Reading battery, this effect size translates to a gain of +18 percentage points in the treatment group, as compared with control students. The growth rate observed in students who participated in Reading Recovery over approximately a five-month period was 131 percent of the national average rate of progress for first-grade students.

For students in high schools, Cook, et al. (2014) reported on a randomized controlled trial of a two-pronged intervention that provided disadvantaged youth with tutoring and counseling. They found intensive individualized academic extra help – tutoring – combined with non-academic supports seeking to teach grade nine and 10 youth social-cognitive skills based on the principles of cognitive behavioral therapy, led to improved math and reading performance. The study sample consisted mainly of students from low income and minority backgrounds, who generally pose the toughest challenges. The effect size for math was 0.65 and for reading was 0.48; the combined program also appeared to increase high school graduation by 14 percentage points (a 40 percent hike). The authors concluded this intervention seemed to yield larger gains in adolescent outcomes per dollar spent than many other intervention strategies.

These studies are highlighted for several reasons. First, they represent new, randomized controlled trials, supporting the efficacy of tutoring. Second, they show tutoring can work not only for elementary but also for high school students, whereas most of the tutoring research addresses elementary-aged students. Third, they show tutoring can work even in the most challenging educational environments. Lastly, they bolster the EB Model recommendation below that extra help resources in schools triggered by poverty and ELL status should also include some non-academic, counseling resources as well, as the treatment in the second study was tutoring combined with counseling.

As noted above, earlier EB analysis did not include any minimum tutors. The current EB Model provides one *core* tutor/Tier 2 intervention position in each prototypical school, and still includes the additional

tutor positions of one position for every 100 poverty and ELL students. The additional support beyond the first tutor per prototypical school is discussed again in Elements 22 and 26 below.

### 7. Substitute Teachers

Schools need some level of support for substitute teachers to cover classrooms when teachers are sick for short periods of time, absent for other reasons, or on long-term leave. In many other states, substitute funds are budgeted at a rate of about 10 days per teacher. The EB model approach, providing funding equal to five percent of the cost of teacher salaries, approximates that ten-day figure.

Model Element	2016 Evidence-Based Recommendation
7. Substitute Teachers	5% of core and elective teachers, instructional coaches, tutors (and teacher positions in additional tutoring, extended day, summer school, ELL, and special education)

#### Analysis and Evidence

Five percent of a teacher work year equals approximately 10 days, so this provision provides up to ten days of substitute teacher resources for each teacher. This approach does not mean that each teacher is provided ten substitute days a year; it means the district receives a “pot” of money approximately equal to 10 substitute days per year for all teachers, in order to cover classrooms when teachers are sick for short periods, absent for other reasons, or on long term sick or pregnancy leave. This allocation is not for 10 days above what is currently provided, it simply is an amount of money for substitute teachers estimated at 10 days for each teacher on average. These substitute funds are not meant to provide for student free days for professional development. The professional development recommendations are fully developed in a separate section below (Element 16).

### 8. Core Guidance Counselors and Nurses

The previous EB model provided student or pupil support resources without specifying guidance counselor or nurse positions. During the past five years, that approach has been changed to provide guidance counselor and nurse positions in the core program, and to provide additional pupil support positions (e.g., social workers and family liaison persons) on the basis of poverty and ELL student counts as described in Element 23 below. Thus, core student support services now specify guidance counselor and nurse positions.

Model Element	2016 Evidence-Based Recommendation
8. Core Pupil Support Staff, Core Guidance Counselors and Nurses	1 guidance counselor for every 450 grade K-5 students 1 guidance counselor for every 250 grade 6-12 students 1 nurse for every 750 K-12 students (Additional student support resources are provided on the basis of poverty and ELL students in Element 23)

## Analysis and Evidence

Schools need guidance counselors and nurses. For guidance counselors, the EB Model uses the standards from the American School Counselor Association.<sup>4</sup> Those standards recommend one counselor for every 250 secondary (middle and high school) students. This produces 1.8 guidance counselor positions for the 450-student prototypical middle school and 2.4 guidance counselor positions for a 600-student prototypical high school.

Today many states require guidance counselors in elementary schools as well. Moreover, even in states that do not require counselors at the elementary level, a growing number of elementary schools have begun to employ these personnel. Consequently, the EB Model includes a minimum of one guidance counselor for a 450-student prototypical elementary school.

In addition to counseling needs, the physical and medical needs of students also have changed dramatically over the past several years. Many students need medications during the school day and school staff often administer these medications. Many students have additional medical or physical needs and our experience in several states suggests these needs have been growing over the past decade. Consequently, the EB Model has been enhanced to provide nurses as core positions. Drawing from the staffing standard of the National Association of School Nurses,<sup>5</sup> the EB Model provides core school nurses at the rate of one nurse position for every 750 students.

### 9. Supervisory and Instructional Aides

Supervisory aides are non-certified individuals who provide needed services and supervision needed in a school such as lunch duty, hallways, and external door monitoring, and helping elementary students get on and off buses. Supervisory aides do not provide instructional assistance to teachers inside or outside the classroom nor instruction of any kind to students. They are provided so teachers are not used for non-instructional duties and can use portions of pupil free time for teacher collaborative work as well as individual planning and preparation.

Model Element	2016 Evidence-Based Recommendation
9. Supervisory and Instructional Aides	2 for each prototypical 450-student elementary and middle school 3 for each prototypical 600-student high school

## Analysis and Evidence

Elementary, middle, and high schools need staff for responsibilities that include lunch duty, hallway monitoring, before and after school playground supervision, and others. Covering these duties generally requires an allocation of supervisory aides at about the rate of two supervisory aide positions for a school of 400-500 students.

However, research does not support the use of instructional aides for improving student performance. As noted above (Element 2), the Tennessee STAR study, which produced solid evidence through field-based

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<sup>4</sup> <https://www.schoolcounselor.org/>

<sup>5</sup> <https://www.nasn.org/>

randomized controlled trials that small classes work in elementary schools, also produced evidence that instructional aides in a regular-sized classroom do not add instructional value, i.e., do not positively impact student achievement (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. Two studies 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 study by Miller (2003) showed instructional aides could also have an impact on reading achievement if used to provide individual tutoring to struggling students in the first grade. Neither of these studies, however, supports the typical use of instructional aides as general teacher helpers. The studies also show that such aides have only about half the impact on student achievement compared to licensed teacher tutors.

### 10. Library Media Specialists

Most schools have a library, and staff resources must be sufficient to operate the library and to incorporate appropriate technologies into the library system.

Model Element	2016 Evidence-Based Recommendation
10. Library Media Specialist	1.0 library media specialist position for each prototypical school

#### Analysis and Evidence

There is scant research on the impact of school librarians on student achievement. In 2003, however, six states conducted studies of the impacts of librarians on student achievement: Florida, Minnesota, Michigan, Missouri, New Mexico, and North Carolina. In 2012, Colorado conducted a study using data from 2005-2011. The general finding was, regardless of family income, children with access to licensed librarians working full time perform better on state reading assessments (Rodney, Lance, & Hamilton-Rennell, 2003; Lance & Hofschire 2012). The Michigan study found regardless of whether the librarian was licensed, student achievement was better for low-income children, but having a licensed librarian was associated with higher achievement than having an unlicensed librarian (Rodney, Lance, & Hamilton-Rennell, 2003). Each state examined the issue differently, but library staffing and the number of operating hours were generally associated with higher academic outcomes. The EB Model recommendation for library staff is derived from best practices in other states, state statutes where they exist and the above research.

The importance of the school library as a resource-rich learning center has developed and evolved with the addition of technology. In libraries, students can explore and individualize their learning experience, using all modalities of learning, through access to both electronic and print materials that enhance the curriculum.

Librarians can act as a partner in student achievement, assisting students to hone their 21<sup>st</sup> Century skills and preparing them to be successful in the post-secondary environment and the workplace. The library experience becomes more valuable to students and staff when libraries are staffed with licensed librarians

and, for large schools, library aides that can help students effectively search, cull, and synthesize information found in the many books, magazines, and myriad sources available on the internet.

There is much anecdotal data about how librarians may enhance student learning and achievement; however, the empirical data are limited. Some studies demonstrate positive benefits; yet many of these benefits could be attributed to other sources as well. It is difficult to establish direct causality (American Association of School Librarians, 2014). Despite these challenges, the sources cited above conclude that libraries and librarians can play a role in increasing student achievement.

For libraries to be effective, they must be adequately staffed. Research is silent on the number of staff members required to provide useful service to school staff and students. Because of the lack of literature on library staffing numbers, it is appropriate to examine general practices in a large number of districts and states to understand what is working in school libraries across America.

Fortunately, through an extensive survey of school libraries conducted in 2011-12, the National Center for Educational Statistics (NCES) calculated average library staff in school libraries at both the elementary and secondary levels (NCES, 2015). To represent all staff working in the library, NCES categorized library personnel into three categories; librarians/media (aide) specialists, other professional staff, and other paid staff. The findings suggested that the EB Model of providing one librarian for every prototypical staff was appropriate, and would provide for the more non-licensed staff found in school libraries much larger than the EB Model prototypes.

#### School Computer Technicians

The role of the library media specialist – the individuals in the past who organized the multi-media instruments such as movie and slide projectors, and who became the computer experts in schools – has recently evolved into what the EB Model terms the “school computer technician.” As the number of computers continues to increase at the school site and online testing and curriculum become more prevalent, it becomes imperative for districts to deliver quick and efficient technology support to teachers and students. Districts can provide this support through the school computer technician. The school computer technician offers all “first level” support, including, solutions to basic break-and-fix issues, connectivity difficulties, configuration errors, and printing concerns. The school computer technician can set up an LCD projector for the principal, install software for teachers, reset email and student-administration accounts, and clearly explain and demonstrate the proper use of computer hardware and devices from ergonomic mice to electronic Smartboards.

When the library was the sole source for multimedia materials, library media technicians would wheel filmstrip projectors into classrooms to create multimedia experiences for students. Because of the nexus to multimedia, as computers entered the schools, the first computer laboratories were traditionally in or close to libraries. Many library media technicians learned how to troubleshoot the machines based on their technical prowess and proximity to the lab environment.

As schools acquire more technology, using carts of laptops and banks of computers in classrooms, the “computer lab” function of the library is being distributed throughout the school. The library is no longer the only hub of multimedia resources and the sole keeper of the multi-media experience. Libraries now assist in directing students to resources.

For teachers and other staff to take full advantage of the benefits technology can provide, they need to feel support is close by and available. Having a school computer technician, instead of library media aides, on campus can generate a sense of technological security.

General support for computers and for their maintenance and configuration has traditionally been district-based. School sites submit service requests to the district and wait to see when a technician will come. In the revised EB recommendation, district technicians still handle the more difficult issues, while school computer technicians have most of their time scheduled to be at specific campuses. They participate at the sites like a staff member and can be directed during their scheduled time by the principal and/or other site administrators. However, the EB Model’s school computer technicians are included in the Central Office staffing, not library staffing.

### 11. Principals and Assistant Principals

Every school needs a principal. There is no research evidence on the performance of schools with or without a principal. All comprehensive school designs, and all prototypical school designs from all professional judgment studies around the country, include a principal for every school unit.

Model Element	2016 Evidence-Based Recommendation
11. Principals and Assistant Principals	1.0 principal for the 450-student prototypical elementary school 1.0 principal for the 450-student prototypical middle school 1.0 principal and 1.0 assistant principal for the 600-student prototypical high school

#### Analysis and Evidence

Much is written about the importance of school principals; few if any studies of schools that boost student learning find the absence of a principal and nearly all such schools, including those studied as part of other state adequacy projects, have strong principal leaders. Chenoweth and Theokas (2011) provide one of the most readable descriptions of the various roles principals play in creating and leading effective schools, from instructional leadership, to managing the building, creating a culture of respect and high expectations for students and teachers, and managing outside relationships. Principals who want to “get it done,” meaning produce large gains in student learning while also reducing achievement gaps, would be wise to read this helpful book. Chenoweth’s (2017) most recent book on cases of schools that boost student achievement provides additional detail on the management and leadership tasks of principals that turn around schools, start effective schools from scratch or lead schools to even higher levels of performance.

Few if any comprehensive school designs for 500 students include assistant principal positions. Very few school systems around the country provide assistant principals to schools with 500 or fewer students. The EB model recommends that instead of one school with a large number of students, school buildings with large numbers of students be subdivided into multiple school units within the building, with each unit having a principal. This implies that one principal would be required for each school unit. The EB model provides one assistant principal for the prototypical high school, largely for discipline and athletics.

Neumerski (2012) reviews the knowledge about the principal’s role in instructional leadership, and updates that knowledge base in relation to current findings on the emerging roles of teachers and

instructional coaches – individuals who also provide instructional leadership inside schools. Her review identifies ways all three roles can be integrated to ensure that a robust set of coordinated, direct and indirect instructional leadership functions exist in schools – all of which are compatible with the EB model’s leadership resources.

## 12. School Site Secretarial Staff

Every school site needs secretarial support to provide clerical and administrative support to administrators and teachers, to answer the telephone, greet parents when they visit the school, help with paper work, and perform many other administrative support tasks.

Model Element	2016 Evidence-Based Recommendation
12. School Site Secretarial Staff	2.0 secretary positions for the 450-student prototypical elementary school 2.0 secretary positions for the 450-student prototypical middle school 3.0 secretary positions for the 600-student prototypical high school

### Analysis and Evidence

The secretarial ratios included in the EB Model generally are derived from common practices across the country. There is no research on the impact secretarial and clerical staff have on student outcomes, yet it is impossible to have a school operate without adequate staff support.

## Dollar per Student Resources

This section addresses areas funded by dollar per student amounts, including resources for gifted and talented, professional development, instructional materials and supplies, formative/short cycle assessments, computers and other technology, career and technical education equipment and materials and extra duty/student activities.

## 13. Gifted and Talented Students<sup>6</sup>

A complete analysis of educational adequacy should include the gifted, talented, and able and ambitious students, most of who perform above state proficiency standards. This is important for all states whose citizens desire improved performance for students at all levels of achievement.

Model Element	2016 Evidence-Based Recommendation
13. Gifted and Talented	\$40 per student

### Analysis and Evidence

Research shows that developing the potential of gifted and talented students requires:

- Effort to discover the hidden talent of students, including low income and/or culturally diverse students;
- Curriculum materials designed specifically to meet the needs of talented learners;
- Acceleration of the curriculum; and

<sup>6</sup> This section is based on an unpublished literature review written by Dr. Ann Robinson, Professor, University of Arkansas at Little Rock.

- 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, nonverbal measures, open-ended tasks, extended try-out and transitional periods, and inclusive definitions and policies produce increased and more equitable identification practices for high ability culturally diverse and/or low-income learners. 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, as well as other measures of school achievement, than a comparable group of high ability students who did not participate (Struck, 2003).

Access to Curriculum. Overall, research shows curriculum programs specifically designed for talented learners produce greater learning than regular academic programs. Increased complexity of the curricular material is a key factor (Robinson & Clinkenbeard, 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, 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; VanTassel-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 students 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) to subject matter acceleration (going to a higher-grade level for one class) to high school course options like AP 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 (Gallagher, 1996; Kulik & Kulik, 1984; Southern, Jones & Stanley, 1993), including AP classes (Bleske-Rechek, Lubinski & Benbow, 2004). Multiple studies also report participant satisfaction with acceleration and benign effects on social and psychological development.

Access to Trained Teachers. Research and teacher reports indicate general classroom teachers make very few, if any, modifications for academically talented learners (Archambault, et al, 1993), even though talented students have mastered 40 to 50% of the elementary curriculum before the school year begins. In contrast, teachers who receive appropriate training are more likely to provide classroom instruction that meets the needs of talented learners. Students report differences among teachers who have had such training, and independent observers in the classroom document the benefit of this training as well (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 coaches recommended (Element



7) (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, which could be accomplished with the professional development resources recommended (Element 16).

Overall, research on gifted programs indicates the effects on student achievement vary by the strategy of the intervention. Research in the 1990s found that enriched classes for gifted and talented students produced effect sizes of about +0.40 and accelerated classes for gifted and talented students produced somewhat larger effect sizes of +0.90 (Gallagher, 1996; Kulik & Kulik, 1984; Kulik & Kulik, 1992). These conclusions were generally confirmed by a recent meta-analysis of 100 years of research on the effects of ability grouping and acceleration on academic achievement of K-12 students (Steenbergen-Hu, Makel & Olszewski-Kubilis, 2016). Talented students benefit substantially from “accelerated” practices, both within classrooms and across grades.

Practice Implications. At the elementary and middle school level, our understanding of the research on best practices is to place gifted students in special classes comprised of all gifted students and accelerate their instruction because such students can learn much more in a given time period than other students. When the pull out and acceleration approach is not possible, an alternative is to have these students skip grades in order to be exposed to accelerated instruction. Research shows neither of these practices systemically produces social adjustment problems. Many gifted students get bored and sometimes restless in classrooms that do not have accelerated instruction. Both of these strategies have little or no cost, except for scheduling and training of teachers, resources for which are provided by professional development (Element 16).

The primary approach to serve gifted students in high schools is to enroll them in advanced courses, such as AP and IB, to participate in dual enrollment in postsecondary institutions, or to have them take courses through distance learning mechanisms.

To supplement such practices, the University of Connecticut Center on the Gifted and Talented developed a very powerful internet-based platform, Renzulli Learning, which provides for a wide range of programs and services for gifted and talented students. This 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 multiple internet data systems, including interactive web-sites and simulations that provide a wide range of opportunities to engage the student’s interests. Several years ago, Renzulli stated that such an approach was undoubtedly the future for the very bright student and could be supported by a grant of \$25 per student in a district. Field (2007) found that after 16 weeks, students given access to an internet-based program, such as Renzulli Learning to read, research, investigate, and produce materials, significantly improved their overall achievement in reading comprehension, reading fluency and social studies.

Renzulli Learning was originally run by the Connecticut National Research Center on the Gifted and Talented. In 2005, Renzulli Learning was sold to Compass Learning, an educational organization headquartered in Austin, Texas with technology-based applications used around the country. Compass Learning renamed the Renzulli Learning program GoQuest. According to the company’s website,<sup>7</sup> a student’s first experience with Renzulli Learning is with the Renzulli Profiler, a detailed online

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<sup>7</sup> <http://www.renzullilearning.com/>

questionnaire that allows the software to generate a personal profile of each student’s top interests, learning styles, and expression styles, making it easier for teachers to get to know their students and effectively differentiate instruction. Once a profile is generated, students and teachers use it to guide their exploration of the 40,000 online educational resources in the database. Students can engage in self-directed learning by exploring safe, fully-vetted resources that have been specifically matched to their individual profiles. Further, teachers can browse the database of resources to find activities that also align to specific objectives, skills, as well as State and Common Core Curriculum Standards.

In summer 2015, the study team spoke with Troy Duffield, who was the Compass Learning’s lead consultant for the Rocky Mountain region. He described the attributes of Renzulli Learning and other products provided by Compass Learning and we confirmed a new pricing structure for Renzulli Learning. The cost today is \$40 per student for up to 125 students in a school, at which point the cost is \$5,000 for a school and all students have full access to the program. If a figure of \$40 per student were included in the EB Model, all districts would be able to afford this gifted program.

Compass Learning also offers products that can be used for both teaching the regular curriculum and providing extra help to struggling students, and these additional products have been adopted by school districts across the country. These products integrate the instructional strategies with results of testing data from three of the most popular interim, short cycle testing systems many districts use: the MAP results from the Northwest Evaluation Association (NWEA), the STAR Enterprise assessments from Renaissance Learning, and Scantron. The costs of these additional Compass Learning programs range from \$70 to \$115 per student per program, and could be funded from a district’s regular instructional and professional development budgets or the resources provided by the poverty student or ELL programs.

#### 14. Intensive Professional Development

Professional development includes a number of important components. This section describes the specific dollar resource recommendations the EB Model provides for professional development. In addition to the resources listed here, PD includes the instructional coaches described in Element 7 and the collaborative planning time provided by the provisions for elective or specialist teachers. Those staff positions are critical to an adequate PD program along with the resources identified in this section.

Model Element	2016 Evidence-Based Recommendation
14. Intensive Professional Development	10 days of student-free time for training built into the teacher contract year \$125 per student for trainers (In addition, PD resources include instructional coaches [Element 5] and time for collaborative work [Element 4])

#### Analysis and Evidence

Effective teachers are the most influential factor in student learning (Rowan, Correnti & Miller, 2002; Wright, Horn & Sanders, 1997) and more systemic deployment of effective instruction is key to improving student learning and reducing achievement gaps (Odden, 2011a; Raudenbusch, 2009). All school faculties need ongoing professional development. Improving teacher effectiveness through high-quality professional development is arguably one of the most important strategies effective schools deploy, and thus providing resources to deploy those programs is important.

An ongoing, comprehensive, and systemic professional development strategy is the way in which all the resources recommended in this report are transformed into high-quality, Tier 1 instruction that increases student learning. Further, though the key focus of professional development is for better instruction in the core subjects of mathematics, reading/language arts, writing, history and science, the professional development resources in the EB Model are adequate to address the instructional needs for gifted and talented, special education, ELL students (including sheltered-English pedagogy), embedding technology in the curriculum and for elective teachers as well. Finally, all beginning teachers need intensive professional development, first in classroom management, organization, and student discipline, and then in instruction. The most effective way to “induct” and “mentor” new teachers is to have them working in functional collaborative teacher teams, discussed in Elements 4 and 5.

Fortunately, there is substantial research on effective professional development and its costs (e.g., Crow, 2011; Odden, 2011b). Effective professional development is defined as professional development that produces change in teachers’ classroom-based instructional practice that 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 [see Kennedy (2016) for a review]. Combined, these studies and reports from Learning Forward, the national organization focused on professional development (see Crow, 2011), 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 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 participants are expected to spend in the activity, as well as the span of time over which the activity takes place. 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 research suggests effective professional development should be organized around groups of teachers from a school that over time includes the entire faculty.
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 research concludes teachers need to know the content they teach, need to know common student miscues or problems students typically have learning the content, and effective instructional strategies linking the two. The content focus today should emphasize content for college and career ready curriculum standards.
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, refining and implementing a standards-based curriculum unit. The research has shown 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 (see also 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, interrelated 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 – 10-day – summer training institute) as well as considerable longer-term work in which teachers work to incorporate the new instructional strategies into their classroom practices, with guidance provided by instructional coaches. Active learning implies some degree of collaborative work and 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 more the coaching, the more time is required of teachers as well as professional development trainers and coaches.

Content focus means effective professional development focuses largely on subject matter knowledge, what is known about how students learn that subject, and the actual curriculum that is used to teach the content. Currently, this means a curriculum program to ensure students are college and career ready when they graduate from high school. Collective participation implies that professional development includes groups of and at some point, all teachers in a school, who then work together to implement the new strategies, engage in data-based decision making (Carlson, Borman & Robinson, 2011) and build a professional community.

Coherence suggests 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 professional development opportunities should be given as part of implementation of new curriculum and instructional approaches, today focusing on the college and career ready standards. There is little support in this research for the development of individually oriented professional development plans; the research implies a much more systemic 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 resource needs.

From this research on the features of effective professional development, the EB Model includes the following for a systemic, ongoing, comprehensive professional development program:

- Ten days of student free time for training embedded in the salary level and a longer teacher work year; and
- Funds for training at the rate of \$125 per student.

The resources for student free time and cost of training are in addition to instructional coaches (Element 5) and collaborative work with teachers in their schools during planning and collaborative time periods (Element 4).

In a December 2016 review of the research on professional development, Kennedy (2016) generally identifies the same structural features of effective professional development as outlined above. She also notes that when effective, the impact of a professional development program is usually stronger in the year following the program and can increase even after that [for an example, see Horn (2010) and Pianta, Allen & King (2011)]. She further states that many studies find little if any impact of a professional development program, but argues that nearly all education research struggles to find consistent findings from all studies. Finally, her review included only programs lasting at least a year, whereas many less effective professional development programs are much shorter. The take away is that professional development can work. It needs all the programmatic features identified above, should last at least a year, and should be followed by intensive coaching of individual teachers in their classrooms – resources for all of which are included in the EB model.

### 15. Instructional Materials

The need for up-to-date instructional materials is paramount. Newer materials contain more accurate information and incorporate the most contemporary pedagogical approaches. New curriculum materials are critical today as the school systems shifts to more rigorous college and career ready standards. To ensure that materials are current, nearly half the states have instituted adoption cycles in which they specify or recommend texts that are aligned to state learning standards (Ravitch, 2004). Up-to-date instructional materials are expensive, but affordable and vital to the learning process. Researchers estimate that up to 90 percent of classroom activities are driven by textbooks and textbook content (Ravitch, 2004). Adoption cycles with state funding attached allow districts to upgrade their texts on an ongoing basis instead of allowing these expenditures to be postponed indefinitely.

Model Element	2016 Evidence-Based Recommendation
15. Instructional Materials	\$190 per student for instructional and library materials

#### Analysis and Evidence

This analysis addresses two issues: instructional materials and library materials.

Instructional Materials. Michigan supports rigorous curriculum standards that prepare all students to be college and career ready, particularly rigorous standards in mathematics, reading/English/language arts, science, history and world languages. Access to standards-aligned instructional resources is critical for teachers and students to successfully implement these standards. Michigan currently does not have a specified textbook adoption cycle. Adoption cycles backed by State funding for materials allow districts

to upgrade their textbooks and instructional materials on an ongoing basis instead of postponing these purchases indefinitely. In 2004, 20 states had instituted adoption cycles in which they specified or recommended texts aligned to state learning standards (Ravitch, 2004). These cycles ranged from five to seven years. Michigan could consider a textbook adoption cycle as a mechanism of insuring that local districts provide students with recent, relevant, and reliable information, particularly if the funding formula included adequate resources to keep instructional materials up-to-date. Textbook adoption is a time consuming, labor-intensive process; without state encouragement, and many times state action, these important and costly decision processes can be delayed by districts for extended periods, to the detriment of the instructional programs and student learning.

The type and cost of textbooks and other instructional materials differ across elementary and secondary levels. Textbooks at the secondary level are more complex and thus more expensive. Elementary grades, on the other hand, use more workbooks, worksheets, and other consumables than the secondary level. Both elementary and secondary levels require extensive pedagogical aides such as math manipulatives and science supplies that help teachers demonstrate or present concepts using different pedagogical approaches.

Textbook prices range widely. At the high school level, textbooks can cost from \$80 to \$140. Most major textbook companies now offer electronic versions of their texts; however, contrary to popular belief, these versions can be more expensive than the paper-based texts. Some digital versions are offered with time-bound contracts, much like library database subscriptions, while others might require the purchase of the paper texts with the digital license. Most digital-only materials from standard publishers are the same price or are only marginally discounted from the paper-based version. Many publishers will offer to sell the paper-based texts with the electronic version for a 20 percent to 30 percent premium.

Unless Michigan decides to fund a one-to-one student computer program, it is not practical to rely exclusively on electronic-based textbooks. One-to-one computer programs also rely on home-based internet connectivity. Until a one-to-one computer program is funded, it is necessary to continue to purchase paper-based textbooks to ensure all students have access to curriculum-appropriate resources.

Considering the move to Michigan’s version of more rigorous curriculum standards, districts should focus on purchasing curriculum and instructional materials that will assist teachers to drive student success. These new, more demanding standards require more reading from information texts across all curricular subject areas. This necessitates the purchase of additional materials that have not been required prior to the implementation of these more rigorous curriculum standards. The EB Model recommendation providing \$170 per student allows school districts to support a six-year standard adoption. The six-year adoption cycle fits nicely with the typical secondary schedule of six content courses (see below). It also comes close to matching the content areas covered at the elementary level.

#### **Six-Year Textbook Adoption Cycle Example**

<b>Year</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>
<b>Content Area</b>	Social Studies	Science, Health, PE	Fine Arts	English Language Arts	Foreign Language	Mathematics

In some years, at the elementary level, there are subject areas that pertain more to the secondary levels.

In these years, the funds for instructional materials provide the opportunity for purchasing not only additional supplementary texts but also consumables/pedagogical aides (see below).

Year	2016	2017	2018	2019	2020	2021
Content Area	Language Arts	Mathematics	Social Studies	Science/ Health	PE, Visual & Performing Arts	Supplements, Consumables, Manipulatives

With more rigorous curriculum standards as a backdrop, the current EB Model recommendation is to create one unified rate of instructional materials, regardless of whether the student attends an elementary or secondary school. The rate of \$170 per student will support the purchase of instructional materials that are best organized to take advantage of Michigan teaching strategies. This funding level would also allow the purchase of digital access to some textbooks if districts desire to adopt and experiment with digital access to textbook materials. If combined with a regular adoption cycle, this annual allocation will allow districts to focus on purchasing new curricular materials for one subject area a year, including textbooks and supplementary materials, all of which are needed to enable teachers to raise student achievement.

A comment on curriculum. It goes without saying that textbooks selection substantially determines the specific curriculum a school will teach. Additionally, some curriculum and instructional programs are more effective than others. Though a complete review of curriculum programs is beyond the scope of this report, which is focused on adequate resources, it is important that districts and schools use the funds for instructional materials to select textbooks, curriculum, and instructional programs that research finds effective. In the section on tutors, the analysis emphasized that structured reading programs, which specifically, systematically, and directly address phonemic awareness and phonics, have been shown by multiple researchers to be more effective, especially for children from lower income and ELL backgrounds.

Similar evidence suggests mathematics programs and instructional practices matter. Many effective schools have used some version of the *Everyday Math* or *Math Their Way* textbooks, which integrate problem solving with concept instruction and an emphasis on arithmetic basics. Further, a recent study concludes that early elementary children with mathematics difficulties are best served by teachers who provide substantial direct mathematical instruction and routine practice and drill on math facts (Morgan, Farkas & Maczuga, 2015). Our conclusion is that some instructional materials are more effective with some or all students than others, and districts and schools should select specific programs only after careful analysis and review to ensure that funds for instructional materials are spent wisely.

Library Materials. The NCES reports the average national expenditure for library materials in the SY 2011-12 was \$16 per student, excluding library salaries (NCES, 2015). Over 90 percent of the \$16 was spent on book titles and the remainder on other resources such as subscription databases. In the past, electronic databases were increasing in use, however use has declined in recent years as many instructional resources such as the Khan Academy and Wikipedia are offered free to the public.

Electronic database services vary in price and scope and are usually charged to school districts on an annual per student basis. Depending on the content of these databases, costs can range from one to five dollars per database per year per student.

Inflating these numbers to adequately meet the needs of school libraries, the EB Model provides \$20 per student to pay for library texts and electronic services. These figures modestly exceed the national average, allowing librarians to strengthen print collections. At the same time, it allows schools to provide, and experiment with, the electronic database resources on which students rely (Tenopir, 2003).

Adding this \$20 per student figure to the \$170 per student figure for instructional materials, brings the 2015 EB Model recommendation to \$190 per student for instructional and library materials.

## 16. Short Cycle/Interim Assessments

The need to monitor students with IEPs and for teachers to engage in collaborative work using student data requires faculties to have access to short cycle, interim assessment data.

Model Element	2016 Evidence-Based Recommendation
16. Short Cycle/ Interim Assessments	\$25 per student for short cycle, interim and formative assessments

### Analysis and Evidence

Data-based decision making has become an important element in school reform over the past decade. It began with the seminal work of Black and Wiliam (1998a, 1998b) on how ongoing data on student performance could be used by teachers to frame and reform instructional practice, and continued with current best practice on how professional learning communities use student data to improve teaching and learning (DuFour, et al., 2010; Steiny, 2009). The goal is to have teachers use data to inform their instructional practice, identify students who need interventions and monitor those students to determine whether the interventions improve student performance (Boudett, City & Murnane, 2007). Today, data-based decision making has become a central element of schools moving the student achievement needle (Odden, 2009, 2012).

Research on data-based decision making has documented significant, positive impacts on student learning. For example, Marsh, McCombs and Martorell (2010) showed how data-driven decision making in combination with instructional coaches produced improvements in teaching practice as well as student achievement. Another study of such efforts using a randomized controlled trial showed that engaging in data-based decision making using interim assessment data improved student achievement in both mathematics and reading (Carlson, Borman & Robinson, 2011).

In light of the high impact of data-based decision making, several articles have appeared recently to help teachers, schools, and districts to design effective structures for both facilitating and enhancing the effects of data based decision making. Hamilton et al. (2009) summarize the research on, and structures of, effective data-based decision-making mechanisms. Datanow (who has conducted several studies of these issues) and Park (2014) produced a handbook on how to structure and implement high impact data-based decision-making processes. The authors followed that book with a more succinct overview of the systems in *Educational Leadership* (Datanow & Park, 2015). And the late Richard DuFour (2015), another of the country's experts of teacher collaborative work using student data, also provided a synopsis of effective structures and processes for engaging in effective data-based decision making.



### *Diversity of interim assessments*

There is some confusion in terminology when referring to these new assessment data. Generally, these student performance data are different from those provided by state accountability or summative testing. The most generic term is “interim data,” meaning assessment data collected in the interim between the annual administrations of statewide assessments, though some practitioners and writers refer to such data as “formative assessments.” There are at least two kinds of such “interim” assessment data. Benchmark assessments, such as those provided by the NWEA called MAP ([www.nwea.org](http://www.nwea.org)), which are given two to three times a year, often at the beginning, middle and end of the year. They are meant to provide “benchmark” information so teachers can see at the end of the semester how students are progressing in their learning. Sometimes these benchmark assessments are given just twice, once in the fall and again in late spring, and function just as a pre- and post-test for the school year, even though some practitioners erroneously refer to tests used this way as “formative assessments.” Until recently, these test data could not be used for progress monitoring in a RTI program of extra help for struggling students.

A second type of assessment data is collected during shorter time cycles within every quarter, such as monthly, and often referred to as “short cycle” or “formative” assessments. These more “micro” student outcome data are meant to be used by teachers to plan instructional strategies before a curriculum unit is taught, to track student performance for the two to three curriculum concepts that would normally be taught during a nine week or so instructional period, and to progress monitor students with IEPs.

Examples of “short cycle” assessments, the costs of which are discussed more below, include STAR Enterprise from Renaissance Learning ([www.renaissance.com](http://www.renaissance.com)), which is in an online, adaptive system that provides data in reading/literacy and mathematics for grades PreK-12. The basic package takes students about 20-30 minutes to be assessed, is aligned to the common core curriculum standards, can easily be further aligned to more specific state standards, can be augmented with professional development activities and programs, and can be given as often as the teacher wishes. Many Reading First schools, as well as many schools we have studied (Odden & Archibald, 2009; Odden, 2009), use the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) assessments (<http://dibels.uoregon.edu>). Another commercial interim assessment package used frequently is Aimsweb (<http://www.aimsweb.com>).

Many districts have also developed their own benchmark tests, mainly in core subject areas. Others use common unit or chapter tests to gauge interim student progress toward achieving standards. While these tests cannot be normed because of their localized origin, they can provide valuable information to site and district teachers and administrators to ensure students are learning and that teachers have covered the subject standards required in district pacing guides.

Though some “interim” assessments are teacher created, it often is more efficient to start with commercially available packages, most of which today are administered online and provide immediate results. Analyses of the state tests provide a good beginning for schools to redesign their overall educational program. Benchmark assessments give feedback on each semester of instruction and are often used to determine which students need interventions or extra help. But, short cycle assessments provide the information a teacher needs to create a micro-map for how to teach specific curriculum units. Teachers need short cycle assessment and other screening data to design the details of, and daily lesson plans for, each specific curriculum unit in order to become more effective in getting all students to learn the main objectives in each curriculum unit to the level of proficiency.

When teachers have the detailed data from these interim assessments, they are able to design instructional activities that are more precisely matched to the exact learning status of the students in their own classrooms and school. In this way, their instruction can be much more efficient because they know the goals and objectives they want students to learn, and they know exactly what their students do and do not know with respect to those goals and objectives. With these data they can design instructional activities specifically to help the students in their classrooms learn the goals and objectives for the particular curriculum unit.

### *NWEA MAP*

According to the Measures of Academic Progress (MAP) website, the assessments are electronically administered and scored achievement tests designed to measure growth in student learning for individual students, classrooms, schools, and districts. The assessments provide accurate and immediate scores to help teachers plan instructional programs, place new students in the appropriate courses, and screen students for special programs. MAP is a computerized adaptive testing system tailored to a student's achievement level. Each student takes a dynamically developed test. The program instantly analyzes the student's response to each question and based on how well the student has answered all previous questions, provides a question of appropriate difficulty next. The standard package includes assessments for reading, language usage, mathematics, and the upper math series (Algebra I, Geometry, Algebra II, Integrated Math I, and Integrated Math II). A science assessment has recently been added. Further, NWEA has created a Skills Navigator for math and reading that can be used to monitor students receiving interventions. The Skills Navigator is also an online assessment.

Many Michigan districts use the NWEA MAP assessments, which usually are administered in September, January and May and reflect "benchmark" assessments, i.e., assessments that show how students are progressing over the course of the year. In the fall, the results from the screener portion of the MAP can be used to place students into small reading or math groups, and to identify appropriate interventions.

The core MAP assessments can be administered three to four times a year. The cost for the reading, language usage and math assessments is \$13.50 per student per year. The new science test costs an additional \$2.50 per student. The Skills Navigator used for monitoring the progress of students with interventions can be administered as often as needed and costs seven dollars per student and covers both reading and math. All together these assessments would cost \$23 per student. NWEA would negotiate a lower cost if the State negotiated a deal and paid for all students.<sup>8</sup>

### *DIBELS*

Another popular interim assessment is the DIBELS. DIBELS includes a set of procedures and measures for assessing the acquisition of early literacy skills from kindergarten through grade 6. They are administered by teachers and designed to be short (one to six minute) fluency measures used to regularly monitor the development of early literacy and early reading skills. DIBELS is comprised of seven measures to function as indicators of phonemic awareness, alphabetic principle, accuracy, and fluency with connected text, reading comprehension, and vocabulary. DIBELS was designed for use in identifying children experiencing difficulty in acquisition of basic early literacy skills in order to provide

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<sup>8</sup> These cost figures were obtained from a state NWEA liaison for the MAP assessments, Carolyn Mock.

support early and prevent the occurrence of later reading difficulties. The cost is a nominal one dollar per student.

Unfortunately, DIBELS is often administered by an instructional coach, guidance counselor or Title I teacher, or a trained paraprofessional, but not by the student's classroom teacher. Under these circumstances, the assessment data must then be provided to teachers if they are to use the results in classroom activities. This transfer of data can be cumbersome as the data are on paper and not in electronic form.

Another common interim assessment frequently used around the country is AIMSWEB. AIMSWEB, now owned by Pearson, is an assessment system that provides up to 33 alternate forms per skill, per grade. AIMSWEB covers more skill areas and grade levels than any other assessment system.

Although browser-based scoring allows teachers to automatically upload scores to the AIMSWEB database system, the assessment itself is administered to each individual student by the teacher. AIMSWEB assessments include:

- Reading: early literacy, Spanish early literacy, reading (English and Spanish) and reading maze,
- Language arts: spelling and written expression,
- Mathematics: early numeracy, math concepts and applications, and math computations, and
- Behavior: Exclusive screening, monitoring, and intervention tools for behavior and social skills.

The complete AIMSWEB package costs six dollars per student, and the company is moving towards providing the assessments in a computer-based format.

#### *Renaissance Learning's STAR Enterprise*

A fourth type of interim assessment system is an online, computer adaptive assessment system linked to a learning progression. One such system is Renaissance Learning's STAR Enterprise, which includes early literacy, mathematics and reading. This system requires much less teacher time than the teacher administered assessments as students can take these assessments virtually on their own. Since they are online computer adaptive systems, they provide immediate feedback to teachers and include many instructional strategies to address any learning needs identified by the results. These assessments can be administered as often as needed, at no extra cost, so they work well for progress monitoring.

The STAR Enterprise assessment programs support "instructional decisions, RTI, and instructional improvement" by measuring student progress in early literacy, reading, and mathematics. The early literacy program measures student proficiency from pre-kindergarten to grade three. The reading and math programs assess student skills for grades one to 12. A science assessment is also being developed.

Subscriptions to STAR Enterprise products cost \$3.80 per student for each assessment: math, reading and early literacy. The smallest subscription size available is 100 students. A more comprehensive subscription, STAR 360, costs \$11.45 per student. In addition to the per student subscription fee, subscribers must pay a small annual fee (\$500 in 2013) for online product hosting services. New subscribers to STAR Enterprise pay a one-time licensing fee of \$1,600.

### *Costs of interim assessments*

The costs of these powerful assessments are modest. In the past, the EB Model provided \$30 to \$35 per student, which was more than sufficient for a school to purchase access to the system, as well as some specific technological equipment and related professional development. The Renaissance Learning STAR assessments can function as both interim and benchmark assessments, can be used to progress monitor students with IEPs, include both math and reading PreK-12, and cost less than this figure. Some districts have dropped Scantron, NWEA MAP, and Aims Web assessments and replaced them with just the single STAR enterprise system that provides all the information of the previous three, and at a lower overall cost.

The EB Model now includes just \$25 per student for these assessments, as their costs have declined. The variety of assessment instruments available commercially to school districts, many of which are used in Michigan districts, are discussed below. They include the NWEA MAP, DIBELS, AIMSWEB, and Renaissance Learning's STAR Enterprise.

### *Final Comments on the Costs of Interim Assessment*

Though districts need interim assessments to provide teachers with interim data for instructional decision making, grouping students, identifying appropriate interventions for struggling students, and monitoring the progress of all students, too many districts across the country have adopted multiple and often overlapping assessments. DIBELS is largely a screener assessment. AIMSWEB, MAP and STAR Enterprise also can function as screeners. Districts do not need both DIBELS and one of MAP or STAR Enterprise. Further, DIBELS and AIMSWEB, while popular, also require teachers to administer the assessments. For these reasons, the computer adaptive assessments – STAR Enterprise and MAP – have become more popular in many places, often replacing both DIBELS and AIMSWEB as well as Scantron, another paper-based testing system.

For more information about benchmark assessments, Hanover Research<sup>9</sup> recently completed an extensive review of the above and other interim assessment systems, including costs and ratings of them from the National Center for Response to Intervention.

## **17. Technology and Equipment**

Over time, schools need to embed technology into instructional programs and school management strategies. Today, states require students not only to be technologically proficient but also to take some courses online to graduate from high school. Many state end-of-year accountability assessments are now taken in an on-line format. Further, there are many online education options, from state-run virtual schools such as those in Florida and Wisconsin, to those created by private sector companies who run many virtual charter schools, such as K12 Inc. and Connections Academy. “Blended instructional” or “the flipped classroom” models, such as Rocketship, have also emerged (Whitmire, 2014). These programs infuse technology and online teaching into regular schools, provide more one to one student assistance, and put the teacher into more of a coaching role (see Odden, 2012). Research also shows these technology systems work well for many students, and can work effectively in schools with high concentrations of

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<sup>9</sup> Hanover Research. (2013). *Review of K12 Literacy and Math Progress Monitoring Tools*. Washington, D.C.

lower income and minority students (Whitmire, 2014). Moreover, they can be less costly than traditional public schools (Battaglino, Haldeman & Laurans, 2012; Odden, 2012).

Model Element	2016 Evidence-Based Recommendation
17. Technology and Equipment	\$250 per student for school computer and technology equipment

### Analysis and Evidence

Infusing technology into the school curriculum has associated costs for computer hardware, networking equipment, software, training, and personnel associated with maintaining and repairing these machines. If these technology elements are not maintained and updated, teachers and students will become disengaged and learning opportunities will be lost.

Purchasing and embedding technology into the operation of schools has both direct and indirect costs. Direct costs include expenditures for the hardware, software, and labor costs for repairing and maintaining the infrastructure and machines. Indirect costs include the expenditures for professional development, loss of time for self-support and casual learning, and additional hours of user application development. This section focuses on direct technology costs, as the indirect costs of training and ongoing professional development are resourced by Element 14.

The EB Model assumes Michigan schools are not beginning at a baseline of zero. All Michigan schools today have some mix of computers of varying ages, the large majority of which are connected to school networks and the internet. Schools have been wired and most are now adding Wi-Fi capabilities and increasing bandwidth. This cost analysis includes funds for upgrading network switchgear and central servers that occur in the normal course of maintenance. The EB Model assumes major capital expenses such as access to fiber optics have been covered, or will be covered, with other funds from the school capital construction program.

We refer readers to a more detailed analysis of the costs of equipping schools with ongoing technology materials (Odden, 2012) spearheaded by Scott Price, now Chief Financial Officer for the Los Angeles County Office of Education. The analysis estimated four categories of technology costs totaling \$250 a student. The amounts by category should be considered flexible, as districts and schools need to allocate dollars to their highest technology priority outlined in state and district technology plans.

The per-student costs for each of the four subcategories are:

1. Computer hardware: \$71.
2. Operating systems, productivity, and non-instructional software: \$72.
3. Network equipment, printers, and copiers: \$55.
4. Instructional software and additional classroom hardware: \$52.

This per student figure is sufficient for schools 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. System software packages vary dramatically in price; the figure recommended would cover medium priced student administrative and financial systems software packages.

The \$250 per student figure, originally developed in 2006 and updated in both 2010 and 2015, allows a school to have one computer for every two to three students. This ratio was 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.

Over the last few years, computer makers have developed alternative products, such as netbooks, Chromebooks and tablet computers that have a lower entry price point of about \$300 per unit compared to the \$500 to \$800 cost for laptop or desktop computers. For school districts that value lowering the student-to-computer ratio, purchase of these devices provides an opportunity to significantly increase the number of student devices when replacing traditional units at their end-of-life. By using non-traditional form factors with lower-priced units, districts can purchase more units and lower their student-to-computers ratios. Additionally, many times it is cheaper for a district to buy additional units of these less expensive computers than to purchase multi-year service agreements.

Though Chromebooks use a different operating system than typically used in the educational environment, most instructional and interactive testing software is browser-based, making the instructional software agnostic regarding operating systems. Additional software is being continually developed for these new platforms as they become more commonly used in the educational space. Google develops applications that will work offline when a Chromebook is not connected to the internet. However, when the Chromebook is not connected to the internet, the functionality of the applications may be limited. This can be a disadvantage for low-income students in one-to-one models or loan program models who do not have internet access at home. Finally, Chromebooks and other such platforms are still not appropriate for the school or district administrative office functions.

As the ratio of these new devices to traditional devices increases there is opportunity for districts to explore one-to-one student-to-computer ratios at key grade levels. As high stakes, computerized testing is pushed further into the primary grade levels, moreover, it is essential students are able to comfortably use computers to demonstrate their knowledge. If students have not had sufficient practice with computers in a testing environment, computerized testing can become a barrier to successfully assessing student achievement. If students cannot comfortably type, text responses become more of a test of “hunt and peck” skills than a reflection of the student’s ability to respond to a prompt.

Although states and districts continue to move to online testing for accountability and short cycle, interim assessments, districts will need to increase the number of devices they have and expand their internet bandwidth to accommodate this testing. Students will also have to become accustomed to using headphones, which are required when testing groups of students together. Again, it is important students feel comfortable with the computers they will use for testing so the hardware does not become a barrier to assessing student knowledge. Many Michigan students already have some experience in online testing in those districts that use the Renaissance Learning Star or NWEA MAP online assessment systems for interim and benchmark assessment data and to show student performance gains for summer school programs.

In considering the above factors, if a district begins to adopt a mix of standard and low-cost units into district inventories, the average cost of a computer unit will drop depending on the percentage of higher and lower priced form factors. Despite this drop in average cost, the EB Model recommendation remains at \$71 per student for computer hardware, recognizing that introducing lower priced units will allow districts to move closer to a one-to-one student to computer ratio and improve refresh rates on all units. It will also allow students to experience a wider breadth of form factors that will better prepare them for the workplace.

In the past, the EB Model has recommended districts either incorporate maintenance costs into lease agreements or, if purchasing the equipment, buy 24-hour maintenance plans to eliminate the need for school or district staff to fix computers. 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. In terms of educator concerns that it would be difficult for a manufacturer's contractors to serve remote communities, the maintenance agreement makes meeting the service requirements the manufacturer's or contractor's problem and not the district's problem. Many of the private sector companies that offer such service 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 to fix broken computers. On the other hand, when districts analyze the cost of warranty programs for Chromebooks or similar low-cost hardware, they may find it is more practical to replace broken machines than to pay for extended warranties.

As the number of computers in schools increases, it becomes more impractical to hard-wire connections into classrooms or other instructional spaces. Wireless connectivity is the only solution to creating an instructional environment in which internet access is available anywhere, anytime on campus. Depending on campus configuration, it is possible to serve a small group of wireless computers with just a few wireless access points. However, as the number of computers being simultaneously used increases, additional access points must be added. The original EB Model recommendation for technology and equipment included modest funds to complete small on-campus infrastructure improvements.

The 2017 EB Model recommendation for technology remains at \$250. In considering inflation of technology costs over time, the cost of some computer related items has decreased although the absolute dollar amount has stayed the same. As technology has improved, price points for many technologies have remained fairly constant as the capacity and demands increase. While general computer and server costs have declined, other technology costs have risen. For example, as the need for bandwidth has increased, the older network switches with speeds of 100 megabits have been replaced with gigabit switches that cost the same as a 100 megabit seven years ago. If Michigan funds school-based technology and equipment at \$250 per student, districts will be able to gradually upgrade necessary network equipment within their campuses and to lower their student-to-computer ratios using a mixture of traditional and new devices.

A Note on Moving to a One-to-One Computer to Student Ratio. There are many in Michigan as well as around the country who argue schools should move to ensure that every student has access to a computer, and that embedding computer technologies fully into the curriculum is an idea whose time has come. One-to-one computing means each student is issued a laptop to use in all classes and at home; this approach has been successfully implemented in some grade levels in districts across the country. Districts

and schools usually begin one-to-one programs by assigning computers at a specific grade level and then letting the students use the computers as they advance to the next grades. In this manner, districts can build a one-to-one computer program over a series of years. Maine, which began a program of providing every student with a computer, has one of the longest running of such programs (Silvernail & Gritter, 2007).

One-to-one programs are more expensive than a three- or two-to-one program, which are covered by the general EB figure of \$250 per student. One-to-one programs raise the cost of all four areas of the previously listed formula, namely: 1) computer hardware, 2) operating systems, productivity, and other non-instructional software, 3) network equipment, bandwidth, Wi-Fi coverage, and 4) instructional software.

In the 2015 recalibration of the Wyoming EB funding formula (Odden & Picus, 2015b), POA argued that Chromebooks were not a viable option for moving to a one-to-one strategy, as they were not as durable as a Windows or Apple based laptop, and did not have the capabilities of user programs as the latter. However, the context has changed rapidly over the past two years. It is now reported that more than 50% of computers used in schools are Chromebook-based. Further, Chromebook technologies have substantially improved. Google continues to enhance its package of free software tools that are cloud based, meaning the "Microsoft Office-type" suite of applications (presentation, word processing, etc.). Further, students who are coming up through the system and have used the Google tools are comfortable with them (they know how to do what they want to do in the programs). In addition, Microsoft keeps improving Microsoft 360 and allowing access to these programs from the cloud, including from the Chromebook device. Finally, school systems have dramatically improved bandwidth to schools, and are shifting to wireless technologies within schools (rather than hard-wiring each classroom).

Thus, the EB estimates of one-to-one costs can be reduced, and refer readers to the 2015 Wyoming report on the details of the \$571 per student estimate for a one-to-one computer program (Odden & Picus, 2015a). Though the costs of hardware drop when one shifts from PC or Apple-based computers to Chromebooks, there are still additional costs for networking equipment (expanding bandwidth and creating within-school wireless systems), printers and servers, as well as non-instructional and instructional software. Those costs can vary depending both on the current status of the school as well as the nature of licensing agreements.

With these caveats, Table 2 summarizes cost difference for a three-to-one and two versions of a one-to-one student to computer ratio. The three-to-one student to computer ratio is the cost per student in the EB Model recommendation at \$250 per student. The one-to-one environment, with PC or Apple computers increases the cost to approximately \$571 per student. A rough estimate of a one-to-one environment with more Chromebook computers reduces the \$571 to about \$400. Again, both of the latter two cost estimates can vary depending on the current networking capabilities of the district and its schools as well as the software licensing agreements it maintains. It is important to note these cost estimates do not include the increased costs for additional personnel needed to service the associated issues that come with three times as many computers.



**Table 2**  
**Cost of Implementing a 1-to-1 Student to Computer Ratio from a 3-to-1 Student to Computer Ratio\***

<b>Subcategory</b>	<b>3-to-1 Student-to-Computer Ratio</b>	<b>1-to-1 Student-to-Computer Ratio*</b>	<b>1-to-1 Student-to-Computer Ratio**</b>
Computer Hardware	\$71	\$213	\$100
Networking Equipment, Copiers, Printers	\$55	\$110	\$100
Non-Instructional Software	\$72	\$144	\$100
Instructional Software	\$52	\$104	\$100
<b>Total Cost per Student</b>	<b>\$250</b>	<b>\$571</b>	<b>\$400</b>

\*Costs are associated with implementing a one-to-one computing program with a full-featured Windows-based laptop.

\*\*Costs associated with more Google and Chromebook-based computers.

*Benefits of One-to-One Computing.*

Advocates of one-to-one computing cite various benefits, including (Oliver, 2012): improved student achievement (especially in writing skills), increased student engagement and collaboration, better implementation of project-based learning, an expansion of learning beyond the classroom, and instant access to information. Opponents claim it is difficult to isolate technology as the only contributing factor to these benefits. Other drawbacks mentioned include: the cost, the need for increased student supervision, and the necessity to provide additional professional development to teachers and other district staff (Sauers & Mcleod, 2012; Jackson, 2009; Goodwin, 2011). Though moving to one-to-one computing is a popular education initiative across the country, there is mixed evidence on its effectiveness in dramatically boosting student achievement (see for example, Goodwin, 2011; Lowther, et al., 2007; Shapley, et al., 2009; Silvernail & Gritter, 2007). On the other hand, a 2016 meta-analysis of the impact of a one-to-one computer format concluded that such programs did improve achievement, though the effect was smaller than tutoring and class size reduction (Zheng, Warschauer, Lin, & Chang, 2016).

Another “label” for one-to-one computers is personalized learning. Personalized learning is instruction that is focused on meeting students’ individual learning needs while incorporating their interests and preferences. Options for personalization have increased as personal computing devices have become increasingly affordable and available in schools and developers created software to support individual student learning. This education approach requires each student to have access to a computer and each student proceeds at his/her own pace. For example, in Mountain View California many students receive the bulk of their education through the Kahn Academy. Students log into computers, watch video lessons, take exams, book slots with teachers for specific instruction, are organized into non-age based groups, and pursue individual goals and schedules, structured to ensure they cover the California curriculum standards (see The Economist, 2017). Similar to the above findings on one-to-one computer programs, research on personalized learning also is mixed (see for example, Pane, et al., 2017).

At this point, the EB model takes a neutral position of a state’s moving to a one-to-one computer to student format and/or personalized learning. If Michigan chooses that option, it would need to increase

the technology allocation from \$250 per student to about \$400 per student, and assess the degree to which additional school computer technicians would be needed.

### **18. Career Technical Education Equipment/Materials**

Vocational education, or its modern term, career, and technical education (CTE), has experienced a shift in focus in the past several years. Traditional vocational education focused on practical, applied skills needed for wood and metalworking, welding, automobile mechanics, typing and other office assistance careers, as well as courses in home economics. Today, many argue that voc-tech is more appropriately info-tech, nano-tech, bio-tech, and health-tech. The argument is CTE should begin to incorporate courses that provide students with applied skills for new work positions in the growing and higher wage economy including information technologies (such as computer network management), engineering (such as computer-assisted design), a wide range of jobs in the expanding health portions of the economy and bio-technical positions – all of which can be entered directly from high school. The American College Testing Company and many policymakers have concluded the knowledge, skills and competencies needed for college are quite similar to those needed for work in the higher-wage, growing jobs of the evolving economy, so all students need a solid academic high school program to be college and career ready when they graduate from high school, all of which align with Michigan education policy.

<b>Model Element</b>	<b>2016 Evidence-Based Recommendation</b>
18. CTE Equipment/ Materials	\$10,000 per CTE teacher for specialized equipment

#### **Analysis and Evidence**

A recent analysis of the impact of substantive CTE programs is that of Shaun Caugherty (2016). This study of career technical programs in Arkansas found that such programs did not track low income students into low quality vocational or career-tech programs. Further, the study found that students who took 3 or more coherent CTE classes (a key element of newer approaches to CTE programming) were 21 percentage points more likely to graduate from high school in four years, and 25 percent more likely to graduate from high school if from a low-income background. Such students also were more likely to attend two- and four-year colleges, to succeed in those college settings and to earn more after high school. This represents one study that shows the potential power of the CTE approach.

A key issue is the cost of CTE programs. Many districts and states believe that new CTE programs cost more than the regular program and even more than traditional vocational classes. However, in a review conducted for a Wisconsin school finance adequacy task force, a national expert on CTE (Phelps, 2006) concluded the best of the new CTE programs did not cost more, especially if the district and state made adequate provisions for professional development (as teachers in these new programs needed training) and computer technologies (as computer technologies were heavily used). These conclusions generally were confirmed by the cost analyses the study team conducted of Project Lead the Way (PLTW), one of the most highly rated and allegedly “expensive” CTE programs in the country. Further, the team recently consulted by telephone with a state liaison for Project Lead the Way and confirmed the cost estimates remain valid.

PLTW is a nationally recognized exemplar for secondary CTE. Often implemented jointly with local postsecondary education institutions and employer advisory groups, these programs usually feature

project- or problem-based learning experiences, career planning and guidance services, and technical and/or academic skills assessments. Through hands-on learning, the programs are designed to develop the science, technology, engineering, and mathematics (STEM) skills essential for achievement in the classroom and success in college or jobs not requiring a four-year college education. Today, PLTW is offered in more than 5,000 elementary, middle, and high schools in all 50 states and enroll over 500,000 students.

The curriculum features rigorous, in-depth learning experiences delivered by certified teachers and end-of-course assessments. High-scoring students earn college credit recognized in more than 100 affiliated postsecondary institutions. Courses focus on engineering foundations (design, principles, and digital electronics) and specializations (e.g., architectural, and civil engineering, bio-technical engineering) that provide students with career and college readiness competencies in engineering and science. Students need to take math through Algebra 2 in order to handle the courses in the program, which also meets many states’ requirements for science and other mathematics classes.

The major cost areas for the program are in class size, professional development, and computer technologies. Most programs recommend class sizes of 25, a figure provided for all secondary classrooms by the EB model. The required professional development and most of the computer technology costs are covered through the professional development and technology components of the EB Model. In most other states, these would be new costs but they are already embedded in the EB model’s approach to school funding. However, a few of the PLTW concentration areas require a one-time purchase of expensive equipment, which can be covered by \$10,000 per CTE teacher.

**19. Extra Duty Funds/Student Activities**

Elementary, middle, and high schools typically provide an array of non-credit producing after-school programs, such as clubs, bands, sports, and other activities. Teachers supervising or coaching in these activities usually receive small stipends for these extra duties.

Model Element	2016 Evidence-Based Recommendation
19. Extra Duty Funds/Student Activities	\$300 per student for co-curricular activities including sports and clubs for grades K-12

**Analysis and Evidence**

Research shows, particularly at the secondary level, students engaged in student activities tend to perform better academically than students not so engaged (Feldman & Matjasko, 2005), although 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, 1996, 1997). Feldman and Matjasko (2005) and Fredericks & Eccles (2006) found participation in interscholastic (as compared to intramural) sports had a positive impact for both boys and girls on: grades, postsecondary education aspirations, reducing dropout rates, lowering alcohol and substance abuse, and led to more years of schooling. The effect was particularly strong for boys participating in interscholastic football and basketball. One reason for these impacts is participation in interscholastic athletics placed students in new social groups that tended to have higher scholastic aspirations and those aspirations “rubbed off” on everyone. But the effects differed by race and gender, and were not as strong for African Americans. Additional research

concludes that students who participate in extracurricular activities from grades eight to 12, attend college, vote in national and regional elections and volunteer at a higher rate (Zaff, et al., 2003). Research also finds, largely in the context of the “No pass, no play” rules, that participation in extracurricular activities significantly reduced student decisions to drop out of high school, compared to similar students who did not participate (Crispin, 2017). The effect was similar for both at-risk and not-at-risk youth.

In an overview of additional research on the impact of non-academic activities on student performance, Bowen and Hitt find that students who participate in sports are more likely to attend college (see also Shifrer, et al., 2015), score higher on academic texts (Lipscomb, 2007) and earn higher wages when adults (Barron, Ewing & Waddell, 2000). Levine (2016) found that student participation in sports or clubs prepared youth for more engagement in adult civil life.

Because of the positive outcomes on student performance, student activities are viewed by many as an integral component of a student’s education. Most states addressing school finance adequacy include an amount for student activities in the formula.

A 2009 national survey asked high school seniors about their participation in high school activities including school newspaper, yearbook, music, performing arts, athletics, academic clubs (e.g. world language, science), student government and other school activities. The results of the survey can be viewed in Table 3. Student respondents indicated 38% participated in athletics, followed by other school activities at 32 percent and music and performing arts at 24 percent. There were differences in participation based on student gender. Female students participated in other school clubs at a rate of 40 percent, athletics 31 percent, and music and performing arts 30 percent. Male students participated in activities in the following rates, athletics 46 percent, other social clubs 24 percent, music and performing arts 18percent, and other activities 12 percent.

**Table 3**  
**National High School Student Participation in Student Activities, 2009**

Activity	Participation Rate (%)		
	Female	Male	Total
Newspaper Yearbook	11.30	5.80	8.70
Music Performing Arts	30.00	17.80	23.90
Athletics	31.40	46.00	38.40
Academic Clubs	16.50	11.60	14.00
Student Council	13.10	5.90	9.60
Other School Clubs	40.00	23.60	31.80

Source: Aud, et al. (2012).

Additional information on student participation is available at the state level through the National Federation of State High School Association (NFHS), an organization providing leadership for the administration of education-based interscholastic activities. NFHS surveyed state level organizations to collect athletic program participation rates based on high school competition in SY 2012-13. Table 4 summarizes the NFHS findings for Michigan and several other Big Ten states. NFHS found high school participation rates for Michigan students are above all state’s shown, except for Minnesota. Data for other

types of student activities are not available. The participation rates contained in Table 3.4 count an individual who participated in two sports twice, three sports three times, etc.

There are no national sources that provide state average expenditures per student for student activities. However, POA conducted a survey of some states for a 2015 Wyoming study. Table 5 shows those expenditures in 2012-13 for Wyoming and its surrounding states. The expenditures range from below \$100 per student to over \$400 per student; however, states do not report such expenditures in a common format, so it is hard to make strong comparisons. For example, some states include transportation expenses in student activities, which can be considerable, and others do not. Some states include some athletic staff, for example athletic directors, in school administration and others include it in student activities. As a result, the numbers are hard to interpret. Wyoming’s figures were especially high because of the costs of transportation between districts separated by scores of miles. Nevertheless, the data show that most states surveyed spent between \$250 and \$300 per student.

**Table 4**  
**High School Student Activity Participation Rates in Student Athletics for Michigan and Surrounding States, SY 2012-13**

State	Boys	Girls	Total	State Student Membership (1)	Athletics Participation as a % of State Student Membership
Michigan	174,429	130,009	304,438	1,555,370	19.6%
Illinois	200,270	139,674	339,944	2,072,880	16.4%
Indiana	91,094	61,483	152,577	1,041,369	14.7%
Minnesota	120,109	110,312	230,421	845,404	27.3%
Ohio	194,330	133,589	327,919	1,729,916	19.0%
Pennsylvania	169,198	146,294	315,492	1,763,677	17.9%
Wisconsin	113,020	79,380	192,400	872,436	22.1%

Source: Survey conducted by National Federation of State High School Associations based on competition at the High School Level in the 2012-13 School Year

[http://www.nfhs.org/ParticipationStatics/PDF/2013-14%20NFHS%20Handbook\\_pgs52-70.pdf](http://www.nfhs.org/ParticipationStatics/PDF/2013-14%20NFHS%20Handbook_pgs52-70.pdf).

Source: National Center for Education Statistics, Selected Statistics From the Public Elementary and Secondary Education Universe: School Year 2012–13], Table 2

<https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2014098>

**Table 3.5 Student Activity Expenditures Per student, SY 2012-13**

State	Total Student Activities Expenditures	Student Membership	Student Activities Expenditures per ADM
Wyoming <sup>10</sup>	\$37,730,125	91,533	\$412.20
Colorado <sup>11</sup>	\$237,610,879	863,561	\$275.15
Idaho <sup>12</sup>	\$26,124,128	284,834	\$91.72
Montana <sup>13</sup>	\$37,082,446	142,908	\$259.48
Nebraska <sup>14</sup>	\$88,217,585	303,505	\$290.66
South Dakota <sup>15</sup>	\$35,002,841	130,471	\$268.28
Utah <sup>16</sup>	\$115,501,624	613,279	\$188.33

In sum, co-curricular activities should be considered an integral part of overall school activities. Just as the curriculum should include the arts, it should also include school activities. During the past several years, the EB Model has allocated between \$200 and \$300 per student for student activities, including intramural sports. These figures are in line with average amounts spent on such activities in many states as just noted. For 2017, the EB model includes an overall figure of \$300 per student.

### **Central Office Functions**

In addition to school level resources, education systems also need resources for district level expenditures including operations and maintenance, the central office and transportation. These are outlined below.

### **20. Operations and Maintenance**

Computation of operations and maintenance costs is complicated by the lack of a strong or consistent research base. Some school finance models allocate a percentage of current expenditures to operations and maintenance. The EB Model uses formulas to compute the number of personnel needed for custodial, maintenance and grounds. Additionally, funding is provided for utilities.

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<sup>10</sup> WDE CRERW report, October 2014.

<sup>11</sup> Colorado Department of Education, Fiscal Year 2012-13 District Revenues and Expenditures, <http://www.cde.state.co.us/cdefinance/fy12-13revexp>.

<sup>12</sup> Idaho State Department of Education, Statewide Summary Combined Statement of Revenues, Expenditures and Changes in Fund Balance, [https://www.sde.idaho.gov/site/statistics/docs/financial\\_summaries/12\\_13/Statewide.pdf](https://www.sde.idaho.gov/site/statistics/docs/financial_summaries/12_13/Statewide.pdf).

<sup>13</sup> Montana Office of Public Instruction, Reported Expenditures by School District, <http://gems.opi.mt.gov/SchoolFinance/Pages/ReportedExpenditureBySchoolDistrict.aspx>.

<sup>14</sup> Nebraska Department of Education, Annual Financial Report - Statewide, <http://www.education.ne.gov/FOS/ASPX/AFR/AFRStatewide.aspx?datayear=2012/13&id=2>.

<sup>15</sup> South Dakota Department of Education, Statewide Annual Financial Report, <http://doe.sd.gov/ofm/documents/FY13StTtl.pdf>.

<sup>16</sup> Utah State Office of Education, Superintendent's Annual Report - Total Statewide Revenue and Expenditures by Fund, <http://www.schools.utah.gov/data/Superintendents-Annual-Report/AR-2012-2013/StatewideFund.aspx>.

Model Element	2016 Evidence-Based Recommendation
20. Operations and Maintenance	Separate computations for custodians, maintenance workers and groundskeepers, and \$305 per student for utilities

Analysis and Evidence

Drawing on professional standards in the field as well as research, we have conducted analyses of the cost basis for maintenance and operations (e.g., Odden & Picus, 2015; Picus & Seder, 2010). The research evidence linking the operations and maintenance of schools directly to student performance is both limited and mixed. Even without a strong basis to support the linkage between facility quality and student outcomes, all students are entitled to attend schools in a safe, clean, and well-maintained environment. The importance of operating and maintaining this investment is clear regardless of the strength of the relationship between them.

Recently, the study team sought to find new research on the structure of maintenance and operations, but found little, if any, new evidence that would alter the basic EB formulas for this formula element. Earthman (2002) noted the importance of school facility conditions as researchers have consistently found a difference of between five and 17 percentile points in performance of students in buildings that are poorly maintained compared to students in standard buildings. Interestingly, correlations were also documented that show teacher effectiveness decreases in schools with poor facilities. The information presented cited not only the importance of clean, maintenance free buildings but also the quality of the thermal and acoustic materials in the environment where students are learning.

In similar work completed by The Tennessee Advisory Commission on Intergovernmental Relations (Young, et. al., 2003), research shows a statistically significant relationship between the condition of a school or classroom with student achievement. Students attending schools in up to date facilities score higher on standardized tests than those in substandard buildings. The committee concluded policy makers should be thinking about the relationship between school facilities and student learning outcomes, not only because of safety and welfare responsibilities to the students and staff, but also because a lack of adequate funding for facilities repair and maintenance can undermine spending in other areas focused on educational reform.

Young, et. al. showed positive educational outcomes were correlated with the following factors:

- New facilities;
- Well-maintained buildings;
- Thermal regulations to avoid excessive temperatures;
- Appropriate lighting levels;
- Utilizing relaxing shades of paint; and
- Limited external noise.

Contrary to this, Picus, Marion, Calvo and Glenn (2005) studied the correlation between the quality of Wyoming school facilities and student outcomes. School facility quality was measured using a 100-point scale developed specifically for Wyoming schools and used to assess every school. These scores were correlated with measures of student outcome and no statistically significant relationship was found. While



this finding does not mean that Michigan should abandon its efforts to provide safe, clean, and well-maintained facilities, the expectation is that those resources should be expected to improve student performance significantly.

In some states, the study team found differences between the amount generated by the EB Model for operations and maintenance and what districts spent. To operate and maintain facilities with modern, technology enhanced, sophisticated control systems, many districts needed an additional level of expertise and training than possessed by extant staff and often subcontracted out such services. Total spending for operations and maintenance was similar to the revenues produced by the model, but the expenditures were in different categories. The study team concluded that the EB recommendation for operations and maintenance is adequate, but that districts might spend the resources in ways that are different from how they are provided.

The discussion below summarizes research on operations and maintenance, identifying the needs for custodians (school level), maintenance staff (district level) and groundskeepers (school and district level), as well as the costs of materials and supplies to support these activities.

*Custodians.* Custodians are responsible for the daily cleaning of classrooms and hallways as well as for routine furniture set ups and takedowns. In addition, custodians often manage routine and simple repairs like minor faucet leaks, and are expected to clean cafeterias/multipurpose rooms, lockers, and showers. Custodial workers' duties are time-sensitive, are structured and varied. Zureich (1998) estimates the time devoted to various custodial duties:

- Daily duties (sweep or vacuum classroom floors; empty trash cans 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 five minutes a day per classroom; and
- 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 physical education equipment.

A formula that was developed to consider these cleaning and non-cleaning duties was updated by Nelli (2006). The formula takes into account teachers, students, classrooms, and gross square feet (GSF) in the school.

The formula is:

$$\text{Base FTE school level custodian position} = (\text{One custodian for every 13 teachers} + \text{One custodian for every 325 students} + \text{One custodian for every 13 classrooms} + \text{One custodian for every 18,000 allowable GSF}) / \text{four}$$



The formula calculates the number of custodians needed at prototypical schools and the district. The advantage of using all four factors for the school custodians is it accommodates growth or decline in enrollment and continues to provide the school with adequate coverage for custodial services over time.

Maintenance Workers. Maintenance workers function at the district level, rather than at individual schools. Core tasks provided by maintenance workers include preventative maintenance, routine maintenance, and emergency response activities. Individual maintenance worker accomplishment associated with core tasks are (Zureich, 1998):

- HVAC systems, HVAC equipment, and kitchen equipment,
- electrical systems, electrical equipment,
- plumbing systems, plumbing equipment, and
- structural work, carpentry and general maintenance/repairs of buildings and equipment.

Zureich (1998) recommends a formula for maintenance worker FTEs incorporated into the funding model for instructional facilities as follows:

$$\begin{aligned} & [(\# \text{ of Buildings in District}) \times 1.1 + (\text{GSF}/60,000 \text{ SqFt}) \times \\ & \quad 1.2 + (\text{enrollment}/1,000) \times 1.3 \\ & \quad + \text{General Fund Revenue}/5,000,000) \times 1.2] / 4 \\ & = \text{Total number of Maintenance Workers needed.} \end{aligned}$$

It is assumed 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.

Groundskeeper Positions. The typical goals of a school grounds maintenance program are generally to provide safe, attractive, and economical grounds maintenance (Mutter & Randolph, 1987). This, too, is a district level function. Although groundskeepers generally work in teams and visit schools on a less than daily schedule, the model estimates groundskeeper resources on the basis of the number of schools. Specifically, it estimates that an elementary school needs the equivalent of 0.25 FTE groundskeeper staff, a middle school 0.5 FTE groundskeeper staff, and a high school 1.5 FTE groundskeeper staff.

Supplies and Materials. Maintenance and custodial supplies are estimated at one dollar per gross square foot, which for the prototypical district is 623,000 square feet.

Utilities. It is necessary to add the per student costs of utilities and insurance to these totals. It is unlikely that a district has much control over these costs in the short run and thus each district can best estimate future costs using their current expenditures for utilities and insurance as a base. The cost of utilities is estimated at \$305 per student.

## 21. Central Office Staffing/Non-Personnel Resources

All districts require central office staff to meet the overall management needs of the educational programs. In other states, evidence-based staffing models were developed using a prototypical district of approximately 3,900 students. Although most states have districts both smaller and larger than 3,900, this figure has worked to determine an adequate base spending level in those states. The per student figure for the 3,900 student districts works for larger districts, even though central office staffing is larger with more discrete positions than the EB prototypical district.

Model Element	2016 Evidence-Based Recommendation
21. Central Office Personnel/ Non-Personnel Resources	A dollar per student figure for the Central office based on the number of FTE positions generated and the salary and benefit levels for those positions. It also includes \$300 per student for miscellaneous items such as Board support, insurance, legal services, etc.

### Analysis and Evidence

Picus Odden and Associates has identified resources for these positions in other reports and the most recent version its textbook (see for example, Odden & Picus, 2014; Picus & Odden, 2010) drawing on a variety of research studies and professional standards for best practices. Over the past several years, the study team has developed central office staffing recommendations in several states, including Maine, Maryland, New Jersey, North Dakota, Vermont, Washington, Wisconsin, and Texas. In all states, POA began its analysis with the research of Elizabeth Swift (2007), who used professional judgment panels to determine staffing for a prototypical district. That research addressed the issue of the appropriate staffing for a district of 3,500 students. Swift’s work formed the basis of each state’s analysis, although in three states (Washington, Wisconsin, and North Dakota) POA also conducted professional judgment panels to review the basic recommendations that emerged from Swift’s research. Through that work, POA was able to estimate the central office resources required for a district of 3,500 students. The initial studies provided for about 8 professional staff (superintendent, assistant superintendent for curriculum, business manager, and directors of human resources, pupil services, technology, and special education) and nine clerical positions.

Although the research basis for staffing school district central offices is relatively limited, analysis of the Educational Research Service (2009) Staffing Ratio report shows that nationally school districts with between 2,500 and 9,999 students employ an average of one central office professional/administrative staff member for every 440 students (Educational Research Services, 2009). This equates to about eight central office professionals (7.95) in a district of 3,500 students. Our research-based staffing formula of eight FTE professional staff matches the ERS estimate of eight FTE central office staff for a school district of 3,500 students nationally.

Because the 3,500-student district size did not readily incorporate the EB model’s prototypical schools, parameters for which are needed to estimate maintenance and operations costs, over the past few years the study team increased its prototypical district size to 3,900 students so it would include, as noted above, four 450 student elementary schools, two 450 student middle schools, and two 600 student high schools. This larger size also allowed the addition of testing and evaluation, and central office computer staff, which districts have been arguing are needed today. Further, in recent analyses, it was recommended that

the EB model add individuals who work with schools to provide the first line technical help – installing computers and their software, insuring that wireless systems operate, keeping printers operating, and related technical assistance to keep all computers operating. The recommendation was one school computer technician for every 600 students working in schools, but operating from the central technology office, which adds six and a half positions to the central office. Subsequently, POA decided that this allocation was a bit too robust and have reduced it to one school computer technician for every 1,000 students, which adds just four positions to the central office.

Moreover, the EB model has been short on central resources for special education and related services. In summer 2015, POA asked a group of superintendents to design central office staff for several sizes of districts. For a 4,000 or 3,900 district office, they recommended that two speech pathologists and two psychologists be added. However, these positions are included in its recommendations for special education staffing (see Element 28), so they are not included in the central office figures. In addition to staffing, central offices need a dollar per student figure for such costs as insurance, purchased services, materials and supplies, equipment, association fees, elections, district wide technology, communications, and other costs. That figure is approximately as \$300 per student.

Table 6 summarizes these staffing proposals organized into departments into which a central office could be organized. The table shows the staff in the previous EB central office as well as the staff in the newer, 3,900-student central office that includes the additional positions discussed above. Larger districts would be provided the resources for a larger central office by prorating up the per student cost of this 3,900-student central office, and they could have more differentiated staff with coordinators as well as a full-fledged legal counsel for large districts.

**Table 6**  
**EB Central Office Staffing for a District with 3,900 students**

Office and Position	FTE		FTE	
	Previous EB Model		Current EB Model	
	Admin.	Classified	Admin.	Classified
<b>Superintendent’s Office</b>				
Superintendent	1		1	
Secretary		1		2
<b>Business Office</b>				
Business Manager	1		1	
Director of Human Resources	1		1	
Accounting Clerk		1		2
Accounts Payable		1		2
Secretary		1		1
<b>Curriculum and Support</b>				
Assistant Supt. for Instruction	1		1	
Director of Pupil Services	1		1	
Dir. of Assessment and Evaluation	1		1	
Secretary		3		3
<b>Technology</b>				
Director of Technology	1		1	
Network Supervisor (Hardware)		1		1

Systems Supervisor (Software)	0.3	1
School Computer Technician	1	4
Secretary	1	2
<b>Operations and Maintenance</b>		
Director of O&M	1	1
Secretary	1	2
<b>Central Office Staffing (3,900)</b>	<b>8</b>	<b>10</b>

## Resources for Struggling Students

The staffing for core programs section contains positions for supporting teachers and students beyond the core classroom teachers. Those positions include: elective or specialist teachers, core tutors, instructional coaches, substitute teachers, core guidance counselors, nurses, supervisory aides, librarians, school administrators and school secretarial staff.

In many instances, additional support for struggling students is needed. The programs described in this section extend the learning time for struggling students in focused ways. The key concept is to implement the maxim of standards-based education reform: keep standards high for all students, but vary the instructional time so all students have multiple opportunities to achieve to proficiency levels. The EB Model elements for extra help are also embedded in the RTI schema described at the beginning of this section.

The EB Model provides substantial additional resources for struggling students: tutors, ELL teachers, pupil support, and summer school and extended day programs. These resources for students struggling should be viewed in concert with resources for students with identified disabilities. Districts sometimes over-identify students for special education services as the “only” way to trigger more resources for some struggling students. The EB Model goal in expanding resources for struggling students is to provide adequate resources – to enable preventive services – for all struggling students, with or without a diagnosed disability, and to reduce over identification in special education by identifying need for special education after providing appropriate preventive services.

This section discusses seven categories of extra help services: tutors, pupil support, extended day programs, summer school programs, ELL teachers, alternative schools, and special education. Tutors, additional pupil support, extended day and summer school programs are provided to all ELL students, and to non-ELL poverty students. In addition, ELL students also receive an ESL allocation. The EB model today embeds “welcome centers” for ELL students new to the country and from situations where prior schooling was limited, such as refugees, etc.

### 22. Tutors

The first strategy to help struggling students is to provide additional support for struggling students as described in Element 8 above. In addition to the one core tutor position provided to every prototypical school discussed above for Element 8, the EB Model provides additional tutor position at the rate of one for every 100 ELL students and one tutor for every 100 non-ELL poverty students.

<b>Model Element</b>	<b>2016 Evidence-Based Recommendation</b>
22. Tutors	1.0 tutor position for every 100 ELL students and one tutor position for every 100 non-ELL poverty students.

Analysis and Evidence

Refer to Element 8 for an explanation of analysis and evidence surrounding the use of tutors.

The EB model provides one tutor for every 100 ELL students, and one tutor position for every 100 non-ELL poverty students. When the model was first changed to include one core tutor position in each prototypical school, the original ratio of additional tutors of one per 100 was raised to one position for every 125 at-risk and ELL students. Though this approach increased tutor/tier 2 interventionist resources for small schools, it actually decreased such resources for larger schools. Thus, the model now provides one tutor position for each prototypical school and uses the original formula for additional tutor resources: one tutor position for every 100 ELL students, and one tutor position for every 100 non-ELL poverty students.

**23. Pupil Support**

Core pupil support positions for guidance counselors and nurses are discussed in Element 10. Students in poverty, however, generally have more non-academic needs that should be addressed by additional pupil support staff, which include additional guidance counselors, as well as social workers, family liaison staff, and psychologists. Thus, in addition to the core guidance counselor and nurse positions, the EB Model provides additional pupil support positions at the rate of one position for every 125 ELL students and one pupil support position for every 125 non-ELL poverty students.

<b>Model Element</b>	<b>2016 Evidence-Based Recommendation</b>
23. Additional Pupil Support	1.0 pupil support position for every 125 ELL students and one pupil support position for every 125 non-ELL poverty students.

Analysis and Evidence

ELL and poverty students tend to have multiple non-academic issues for schools to address. This usually requires interactions with families and parents, social and other service agencies, as well as more guidance counseling in school. The EB Model addresses this by providing more pupil support staffing resources to meet these needs. Although there are many ways schools can provide outreach to parents, or involve parents in school activities – from fundraisers to governance – research shows school sponsored programs that have an impact on 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, programs that help parents and students understand both what needs to be learned and what constitutes acceptable standards for academic performance have been found to improve student outcomes. Parent outreach that explicitly and directly addresses what parents can do to help their children be successful in school, and to understand the standards of performance that the school expects, are the types of school-sponsored parent activities that produce discernible impacts on students’ academic learning (Steinberg, 1997).

At the secondary level, the goal of parent outreach programs is to have parents learn about what they should expect of their children in terms of academic performance. If a district or a state requires a minimum number of courses for graduation, which is the case for Michigan, those requirements should be made clear. Any differences between the two also should be addressed. If either average score on end-of-course examinations or a cut-score on a comprehensive high school test are required for graduation, they too should be discussed. Secondary schools need to help parents understand how to more effectively assist their children in identifying an academic pathway through middle and high school, understand standards for acceptable performance, and be aware of the course work necessary for college entrance. This is particularly important for parents of students in the middle or lower end of the achievement range, as often these students know very little of the requirements for transition from high school to postsecondary education (Kirst & Venezia, 2004).

At the elementary level, the focus for parent outreach and involvement programs should concentrate on what parents can do at home to help their children learn academic work for school. Too often parent programs focus on fund raising through parent-teacher organizations, 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. Parent actions that impact learning would include: 1) reading to them 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.

The resources in the EB Model are adequate to create and deploy the ambitious and comprehensive parent involvement and outreach programs that are part of two comprehensive school designs: Success for All Program and the Comer School Development Program. The Success for All Program includes a family outreach coordinator, a nurse, a social worker, a guidance counselor, and an education diagnostician for a school of about 500 students. This group functions as a parent outreach team for the school, serves as case managers for students who need non-academic and social services, and usually includes a clothing strategy to ensure all students, especially in cold climates, have sufficient and adequate clothes, and coats, to attend school.

The Comer School Development Program was created on the premise of connecting schools more to their communities. Its Parent-School team has a somewhat different composition and is focused on training parents to raise expectations for their children's learning, to work with social service agencies and to work with the school's faculty to raise their expectations for what students can learn. Sometimes the team co-locates on school site premises to provide a host of social services

A program called Communities in Schools, which now operates in 26 states and the District of Columbia and can be resourced by the resources provided by this element, has been successful in raising school attendance rates. The program adds a caseworker, often trained in social work, to a school's pupil support team to help match social services provided by non-educational agencies to students who need them.

## 24. Extended-Day Programs

At both elementary and secondary school levels, some struggling students are likely to benefit from after-school or extended-day programs, even if they receive tutoring or Tier 2 interventions during the regular school day.

Model Element	2016 Evidence-Based Recommendation
24. Extended Day	1.0 teacher position for every 120 ELL and for every 120 non-ELL poverty students.

### Analysis and Evidence

Extended-day programs provide environments for children and adolescents to spend time after the school day ends during the regular school year. In a review of research, Vandell, Pierce and Dadisman (2005) found well designed and administered after-school programs yield numerous improvements in academic and behavioral outcomes (see also Fashola, 1998; Posner & Vandell, 1994). On the other hand, the evaluation of the 21<sup>st</sup> Century Community Learning Centers Program (James-Burdumy et al., 2005), though hotly debated, indicated for elementary students, extended-day programs did not appear to produce measurable academic improvement. Critics of this study (Vandell, Pierce & Dadisman, 2005) argued the control groups had higher pre-existing achievement, which reduced the potential for finding program impact. They also argued the small impacts identified had more to do with the lack of full program implementation during the initial years than with the strength of the program.

Overall, studies have documented positive effects of extended-day programs on the academic performance of students in select after-school programs (e.g., Takoata & Vandell, 2013; Vandell, 2014). Magana, Saab, and Svoboda (2016-17) provide a recent example of how an extended day school program was critical to turning around a low performing middle school in Denver. However, the evidence is mixed because of research methods (few randomized trials), poor program quality and imperfect implementation of the programs studied. Researchers have identified several structural and institutional supports necessary to make after-school programs effective:

- 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);
- Program culture of mastery, i.e., engaging in activities to become more proficient and/or to meet various standards of performance;
- Participation in a structured program;
- 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, and with parents and the community); and
- Program sustainability strategies (institutional partners, networks, linkages; community linkages that support enhanced services; long term alliances to ensure long term funding).

The resources recommended in the EB Model could be used to provide struggling students in all elementary grades and in secondary schools with additional help during the school year, but before or after the normal school day. A recent study of tutoring provided after school found positive impacts for all students in English-language arts and for the bottom half of students in mathematics (Kraft, 2015). Tutoring was provided by recent college graduates, to students individually or in groups of two to four, for one hour a day in each subject from three to five pm.

Because not all ELL or poverty students need or will attend an after-school program, the EB Model assumes 50 percent of the eligible students will attend the program – a need and participation figure identified by Kleiner, Nolin and Chapman (2004). Providing resources at a rate of one teacher position for every 30 ELL and for every 30 non-ELL poverty students results in class sizes of approximately 15 students in extended-day programs. This position is paid at the rate of 25 percent of the annual salary, enough to pay a teacher for a two-hour extended-day program, five days a week. An equivalent but simpler formula for funding this element is to resource one teacher position for every 120 ELL and for every 120 non-ELL poverty students.

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. The study team also encourages all states to 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. States can use this information to develop a knowledge base about which after-school program structures have the most impact on student learning. These extended-day services provided will vary across Michigan’s school districts, and any monitoring of the impacts of these resources should focus more on impacts on student performance than the strategy for providing the services. Most of the schools studied in other states that improved student performance had various combinations of before- and after-school extra help programs.

**25. Summer School Programs**

Many students need extra instructional time to achieve the state’s high proficiency standards. Thus, summer school programs should be part of the set of programs available to provide struggling students the additional time and help they need 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). It should be noted summer school services are provided outside of the regular school year.

Model Element	2016 Evidence-Based Recommendation
25. Summer School	1.0 teacher position for every 120 ELL and for every 120 non-ELL poverty students.

**Analysis and Evidence**

Research dating back to 1906 shows 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. 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 by Alexander and Entwisle (1996) showed these income-based summer learning differences accumulate over the elementary school years, such that poor children's achievement scores – without summer school – fall further and further behind the scores of middle class students as they progress through school grade by grade. As a result of these findings, there is emerging consensus that what happens (or does not happen) during the summer can significantly impact the achievement of students from low-income and at-risk backgrounds, and help reduce (or increase) the poor and minority achievement gaps in the United States.

However, evidence on the effectiveness of summer programs in attaining either of these goals is mixed. 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 (Borman & Boulay, 2004).

A meta-analysis of 93 summer school programs (Cooper, Charlton, Valentine, & Muhlenbruck, 2000) found the average student in summer programs outperformed about 56 percent to 60 percent of similar students not receiving the programs. However, the certainty of these conclusions is compromised because only a small number of studies (e.g., Borman, Rachuba, Hewes, Boulay & Kaplan, 2001) used random assignment, and program quality varied substantially. More recent randomized controlled trial research of summer school reached more positive conclusions about how such programs can positively impact student learning (Borman & Dowling, 2006; Borman, Goetz & Dowling, 2009). And earlier, Roberts (2000) found an effect size of 0.42 in reading achievement for a randomized sample of 325 students who participated in the Voyager summer school program.

Researchers (see also McCombs, et al., 2011) note several program components related to improved achievement effects for summer program attendees, including:

- Early intervention during elementary school;
- Full 6-8-week summer program;
- Focus on mathematics and reading achievement, or failed courses for high school students;
- Small-group or individualized instruction;
- Parent involvement and participation;
- Scrutiny for treatment fidelity, including monitoring to ensure good instruction in reading and mathematics is being delivered; and
- Student attendance monitoring.

Summer programs that include these elements hold promise for improving the achievement of poverty and ELL students and closing the achievement gap. A more recent review of the effects of summer school programs reached this same conclusion (Kim & Quinn, 2013). Their meta-analysis of 41 school- and home-based summer school programs found students in kindergarten through grade eight who attended summer school programs with teacher directed literacy lessons showed significant improvements in multiple areas including reading comprehension. Moreover, the effects were much larger for students from low-income backgrounds.

A 2016 study randomized control trial of summer school, found that summer programs that focused on academics, provided small classes of 15, and lasted for several weeks produced significant impacts on elementary student academic achievement (Augustine, et al., 2016). Not surprisingly, the study found that students that attended such programs for longer times experienced larger gains in reading and math scores

than students who attended for less than four weeks. Drawing from this study and the districts involved, Browne (2016-17) provides practical examples of how districts can design and implement such effective summer school programs, all possible with the EB model's summer school resources.

And finally, a comprehensive book on the "summer slide," written by several of the analysts cited above, expands on the points outlined above. The book describes what is known about learning loss over the summer and what can be done to prevent it (Alexander, Pitcock & Boulay, 2016). The authors' suggestions for how to structure effective summer school programs echo the recommendations above.<sup>17</sup>

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

Summer school can produce powerful impacts. The EB Model provides resources for summer school for classes of 15 students, for 50 percent of all ELL and non-ELL poverty students in all grades K-12, an estimate of the number of students still struggling to meet academic requirements (Capizzano, Adelman & Stagner, 2002). The EB Model provides resources for a program of eight weeks in length and a six-hour day, which allows for four hours of instruction in core subjects. A six-hour day would also allow for two hours of non-academic activities. The formula would be one teacher position for every 30 such students or 3.33 per 100 such students. This position is paid at the rate of 25 percent of the annual salary. Simplified, the formula equates to one teacher position for every 120 ELL and every 120 non-ELL poverty students.

## **26. ESL Staff for English Language Learner (ELL) Students**

Research, best practices, and experience show that ELL students need assistance to learn English, in addition to instruction in the regular content classes and in addition to the above tutoring, pupil support, extended day and summer school resources. This can 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 who arrive as new immigrants to the country and the school throughout the year. The EB Model provides ESL teachers in addition to the tutors, pupil support, extended-day and summer school for all ELL students using the ELL count.

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<sup>17</sup> Lynch and Kim (2017) report that a randomized controlled trial of an on-line summer school program for mathematics had no impact on student learning but could not determine whether it was the on-line curriculum itself, or some other programmatic element – like monitoring of students engaging in the online instruction – that diminished the impact.

Model Element	2016 Evidence-Based Recommendation
26. ESL staff for English Language Learner (ELL) Students	As described above: 1.0 tutor position for every 100 ELL students 1.0 pupil support position for every 125 ELL students 1.0 extended day position for every 120 ELL students 1.0 summer teacher position for every 120 ELL students, and in addition, 1.0 ESL teacher position for every 100 ELL students.

Analysis and Evidence

Good ELL programs work whether the approach is structured English immersion or initial instruction in the native language, often called bilingual education (Clark, 2009). However, bilingual education is difficult to provide in most schools, including most schools in Michigan, because students come from so many different language backgrounds. Thus, most schools have adopted the “sheltered English” approach. According to Wikipedia, sheltered instruction is an approach to teaching English language learners which integrates language and content instruction. Sheltered instruction has two prime goals: 1) to provide access to mainstream, grade-level content, and 2) to promote the development of English language proficiency. Several Michigan EB Professional Judgement panelists stated that their districts had adopted the SIOP approach to sheltered English Instruction. SIOP or the Sheltered Instruction Observation Protocol (SIOP) Model is a research-based and validated instructional model that has proven effective in addressing the academic needs of English learners throughout the United States. The SIOP Model consists of eight interrelated components: lesson preparation, interaction, building background, practice and application, comprehensive input, lesson delivery, strategies and review and assessment (see Echevarria, Vogt, & Short, 2017 for more detail). Several panelists also stated that sheltered instruction represents high-quality and effective instruction, and is effective not only for ELL students but also all students, and particularly at-risk, non-ELL students.

Nevertheless, bilingual programs have been studied intensively. A best-evidence synthesis of 17 studies of bilingual education (Slavin & Cheung, 2005) found 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. A more recent randomized controlled trial also produced strong positive effects for bilingual education programs (Slavin, et al., 2011), but concluded the language of instruction is less important than the approaches taken to teach reading.

Addressing that important issue in *The Elementary School Journal*, Gerstein (2006) concludes ELL students can be taught to read in English if, as shown for monolingual students, the instruction covers phonemic awareness, decoding, fluency, vocabulary and reading comprehension. Gerstein’s studies also showed ELL students benefit from instructional interventions initially designed for monolingual English speaking students, the resources for which are included in the EB Model’s programs for struggling students: tutoring, extended-day, summer school and pupil support.

Beyond the provision of additional teachers to provide English as a second language instruction to students, however, research shows ELL students need a solid and rigorous core curriculum as the basis from which to provide any extra services (Gandara & Rumberger, 2008; Gandara, Rumberger, Maxwell-Jolly, & Callahan, 2003). This research suggests ELL students need:

- Effective teachers – a core goal of all the staffing in the EB Model;
- Adequate instructional materials and good school conditions;
- Good assessments of ELL students so teachers know in detail their English language reading and other academic skills;
- Less segregation of ELL students;
- Rigorous and effective curriculum and courses for all ELL students, including college and career ready, and affirmative counseling of such students to take those courses; and
- Professional development for all teachers, focusing on sheltered English teaching skills.

Hakuta (2011) supports these conclusions, and argues that English language learning takes time and more specifically that “academic language” is critical to learning the new common or college and career ready standards. These more rigorous standards require more explicit and coherent ELL instructional strategies and extra help services if schools are to be effective at ensuring ELL students learn the subject matter, English generally, and academic English specifically, i.e., learn how to read content texts in English. Most also would agree that if this instruction requires smaller regular classes, those are already provided by the EB Model.

Additional teaching staff are needed to provide English as a second language instruction during the regular school day, such as having ELL students take English as a second language course in lieu of an elective course. Although the potential to eliminate some elective classes exists if there are large numbers of ELL students who need to be pulled out of individual classrooms, it is generally agreed that to fully staff a strong ELL program, each 100 ELL students should trigger one additional teaching position. This makes it possible to provide additional instructional opportunities for ELL students to provide an additional dose of English instruction. The goal of this programming is to reinforce ELL student learning of academic content and English so at some point the students can continue their schooling in English only.

Research shows ELL students from lower income and generally less educated backgrounds struggle most in school and need extra help to learn both academics and English. The EB Model addresses this need by ensuring the ESL resources triggered by ELL counts are *in addition* to other Tier 2 intervention resources provided by tutoring, pupil support, extended-day and summer school. Given these realities, it is appropriate to view the EB Model as providing all ELL students tutoring, additional pupil support, extended day, summer school and ESL resources. Put differently, for every 100 ELL students the EB model provides 1.0 tutors, 0.8 pupil support, 0.83 extended day, 0.83 summer school and 1.0 ESL teacher positions, or 4.46 teacher positions for every 100 ELL students. Put differently, every 22.4 ELL students trigger 1.0 additional licensed position to provide the extra help ELL students need to learn to standards.

## **27. Alternative Schools**

A small number of students have difficulty learning in the traditional school environment. The Alternative Learning Environment (ALE) students this report addresses are those who also have some combination of significant behavioral, social, and emotional issues, often also including alcohol or drug abuse. Such students often do much better in small “alternative learning environments.” However, this rationale for ALE does not consider alternative schools for students who simply prefer a different approach to learning academics, such as project-based learning, or more applied learning strategies that can be deployed in

new career technical programs such as computer assisted engineering. The EB concept of alternative schools, which the study team believes is also the state’s concept, is for “troubled” youth who need counseling and therapy embedded in the school’s instructional program.

In addition, the alternative school funding formula can also be used to fund “welcome programs” for students who have recently entered this country, often from an environment of refugee status, refugee camps, and little access to formal schooling.

<b>Model Element</b>	<b>2016 Evidence-Based Recommendation</b>
27. Alternative Schools	One assistant principal position and one teacher position for every 7 ALE students; One teacher position for every 7 Welcome Center eligible ELL students

### Analysis and Evidence

The Institute for Education Sciences at the United States Department of Education published statistics on alternative schools and programs for SY 2007-08 (Carver & Lewis, 2010). That study identified 558,300 students in 10,300 district-administered alternative education schools and programs across the United States. Although the report did not provide data on the size of these schools or on staffing ratios, the data suggest an average alternative school size of 54 students. Most of the programs served students in grades 9-12. The main reasons students were enrolled in alternative programs – all of which meet our initial definition of severe emotional and/or behavioral problems – included:

- Possession or use of firearms or other weapons;
- Possession, distribution, or use of alcohol or drugs;
- Arrest or involvement with the criminal justice system;
- Physical attacks or fights;
- Disruptive verbal behavior;
- Chronic truancy;
- Continual academic failure;
- Pregnancy/teen parenthood; and
- Mental health needs.

One of the major issues states face in creating funding programs for alternative schools is defining them. Our original review of literature and state practice on alternative education provided little guidance for developing a clear definition of alternative education. More recently, and as part of implementing its compulsory attendance laws, Maryland commissioned a study to review state definitions of ALE programs (see Porowski, O’Conner & Luo, 2014). Maryland needed a definition because attendance in an ALE program was an exemption in its compulsory attendance law and the state did not have a clear definition of such programs. The study found great variation across the states in both defining and structuring alternative education programs. Because individual states or school districts define and determine the features of their alternative education programs, they tend to differ in key characteristics, such as target populations, setting, services, and structure.

A formal definition of an ALE program would need to consider the target population (including both grade levels served and types of students), program setting (within a public school or outside such a

structure), program offerings (academic, behavioral, counseling, social skills, career counseling, etc.) and structure (how programs are scheduled, staff responsibilities, etc.). The Porowski, O’Conner & Luo (2014) study found wide variation across states (and districts) as well as these elements.

The 2006 Urban Institute (Aron, 2006) definition of alternative education closely follows our understanding of such programs:

Alternative education refers to schools or programs that are set up by states, school districts, or other entities to serve young people who are not succeeding in a traditional public-school environment. Alternative education programs offer students who are failing academically or may have learning disabilities, behavioral problems, or poor attendance an opportunity to achieve in a different setting and use different and innovative learning methods. While there are many different kinds of alternative schools and programs, they are often characterized by their flexible schedules, smaller teacher-student ratios, and modified curricula.

In 2010, the study team also reviewed state standards – where such existed – for alternative schools. Most states use definitions similar to that of the Urban Institute, but only one state, Indiana, actually established standards for what an ALE program might look like. The Indiana Department of Education’s (2010) website states:

While each of Indiana’s alternative education programs is unique, they share characteristics identified in the research as common to successful alternative schools.

- Maximum teacher/student ratio of 1:15,
- Small student base;
- Clearly stated mission and discipline code;
- Caring faculty with continual staff development;
- School staff having high expectations for student achievement;
- Learning program specific to the student's expectations and learning style;
- Flexible school schedule with community involvement and support; and
- Total commitment to have each student be a success.

These characteristics align with the EB Model view of ALE programs.

From work in other states, the study team has found that funding formulas for alternative schools differ substantially. In a few states, the typical staffing ratio for an alternative school is one administrative position for the school plus one teacher position for every eight students. Because alternative high schools are generally designed to serve students who are severely at-risk, the study team recommends they remain relatively small. Because of the small size of alternative schools, staff at these schools often must fill multiple roles. Many teachers in alternative schools provide many different services for students, including: instruction, pupil support, and counseling services. This suggests the staffing structure and organization for instruction in alternative schools is usually quite different from typical high schools.

Though Michigan could launch a process to more formally define alternative education programs as well as set standards for them, it might also want to simply adopt the Urban Institute’s definition. It could also include a maximum size for any alternative education programs that would trigger alternative education funding. The EB model resources alternative education programs with 1.0 FTE assistant principal position and one FTE teacher position for every seven alternative students, and assumes the programs enroll fewer than 100 students.

#### *Welcome Centers for ELL students*

As noted above, some districts in Michigan – and several other districts across the country – are receiving students from several places around the world which can be characterized by strife, poverty, danger, hunger, war, refugee status or other problematic environments for children. In many cases, children escaping from these contexts and enrolling in U.S. schools have experienced insufficient formal education as well as trauma. Such students need more intensive assistance to become accustomed to the structure of U.S. schools and to effectively participate in formal schooling. These acculturation experiences are best provided in small contexts, often called “welcome centers,” in which small groups of students work with an adult who not only provides appropriate beginning instruction but also supportive counseling and other related services.

Michigan would need to set standards for systematically identifying such students. The EB model would then resource such students with the same formula as that for the more typical alternative school: 1 teacher position for every seven “Welcome Center eligible ELL students.” If there were several such “classrooms” in a school, the formula could include the assistant principal position too. Such resourcing would allow all districts to provide a nurturing and welcoming educational environment for such students until they could function in regular classrooms. Such programs often last nine to 18 weeks, but program length would be determined by state standards.

## **28. Special Education**

Providing appropriate education services for students with disabilities, while containing costs and avoiding over-identification of students, particularly minority students, presents several challenges (see Levenson, 2012). Many mild and moderate disabilities, often those associated with students learning to read, are correctable through strategic early intervention – before a student is identified as an individual with a disability and an IEP is created. This intervention includes effective core instruction as well as targeted Tier 2 intervention programs, particularly one-to-one tutoring (Elements 6 and 22). For those with mild and moderate disabilities who require special programs as identified through an IEP, the EB model relies on a census-based formula that provides additional teaching resources based on the *total* number of students in a school. As described below, these resources are expected to meet the instructional needs of children with mild and moderate disabilities. For children with severe and profound disabilities, the EB model recommends that the state pay the entire cost of their programs, minus the cost of the basic education program for all non-public placements, up to two percent of all students. This section also addresses the issue of related services: speech and hearing disabilities, and the need for Occupational and/or Physical Therapy (OT and PT).

### 2016 EB Recommendation: Special Education

8.1 teacher positions per 1,000 students, which includes 7.1 teacher positions per 1,000 students for services for students with mild and moderate disabilities and the related services of speech/hearing pathologies and/or OT PT. This allocation equals approximately 1 position for every 141 students.

1.0 psychologist per 1,000 students to oversee IEP development and ongoing review.

Full state funding for students with severe disabilities, and state-placed students, minus the cost of the basic education program and Federal Title VIB, with a cap on the number covered at 2% of all students.

#### Analysis and Evidence

In their book on the best approaches to serve students with disabilities, Frattura and Capper (2007) conclude that both research and most leading educators recommend that educating students in general education environments results in higher academic achievement and more positive social outcomes for students with and without disability labels, as well as being the most cost-effective way to educate students. Thus, they recommend that school leaders focus their efforts on preventing student underachievement and alter how students who struggle are educated. Doing so, they argue, will overcome the costly and low performance outcomes of multiple pullout programs. Further, fewer students will be inappropriately labeled with a disability, more students will be educated in heterogeneous learning environments, and higher student achievement and a more equitable distribution of achievement will result (Frattura & Capper, 2007). The bulk of the April 2017 issue of *Educational Leadership* provides this argument in a more advocacy oriented manner and also includes multiple examples of how this approach can be implemented in schools and classrooms. Most states, including Michigan, have implemented this philosophy for several years and it is the philosophy behind the Evidence-Based model as well.

The core principles of such a proactive approach to teaching students with disabilities are that the education system needs to adapt to the student; that the primary aim of teaching and learning is the prevention of student failure; that the aim of all educators is to build teacher capacity; that all services must be grounded in the core teaching and learning of the school and particularly skilled teachers; and, that to accomplish this, students must be educated alongside their peers in integrated environments (Frattura & Capper, 2007).

Supporting this argument, research shows that many mild and moderate disabilities, particularly those associated with students learning to read, are correctable through intensive early intervention. For example, several studies (e.g., Borman & Hewes, 2003; Landry, 1999; Slavin, 1996) have documented that through a series of intensive instructional interventions (e.g. preschool, small classes, rigorous reading curriculum, 1 to 1 tutoring), 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. Other studies have noted decreases in disability labeling of up to 50 percent with interventions of this type (see for example, Levenson, 2011; Madden, Slavin, Karweit, Dolan & Wasik, 1993; Slavin, 1996).

That is why the EB recommendations for extended learning opportunities (Elements 22, 24 and 25) are so important. They, along with core tutoring and pupil support services, are the series of service strategies that can be deployed *before* IEP specified special education services are needed. This sounds like a



common-sense approach that would be second nature to educators, but often educator practices have been rooted in a “categorical culture” that can be modified through professional development and leadership from the district office and the site principal. Further, unlike the EB funding model, many states do not provide sufficient resources for early intervention and preventive services, so students who could have been helped often end up unnecessarily in special education programs. Using a census approach to provide most of the extra resources for students with disabilities, an approach increasing in use across the country, works best for students with mild and moderate disabilities, but only if a functional, collaborative early intervention model (as outlined above) is also implemented. At the same time, it is perfectly legal for a student’s IEP to call for tutoring, extended day help or summer school services that are part of the EB model, even though the services may not be provided by a person with a special education certification.

This proactive approach to special education became evident in the Individuals with Disabilities Education Act (IDEA) of 2004, which changed the law about identifying children with specific learning disabilities. The reauthorized law states that schools will “not be required to take into consideration whether a child has a severe discrepancy between achievement and intellectual ability ...” (Section 1414(b)). Instead, in the Commentary and Explanation to the proposed special education regulations, the U.S. Department of Education encouraged states and school districts to abandon the IQ-achievement discrepancy model and adopt Response to Intervention (RTI) models, also discussed above, based on recent research findings (Donovan & Cross, 2002; Lyon et al., 2001; President’s Commission on Excellence in Special Education, 2002; Stuebing et al., 2002). An RTI model, called a proactive approach above, identifies students who are not achieving at the same level and rate as their peers and provides appropriate interventions, the first ones of which should be part of the “regular” school program and not funded with special education resources (Mellard, 2004).

The core features of RTI, which is a critical part of the EB approach, include:

- High-quality classroom instruction;
- Research-based instruction;
- Classroom performance;
- Universal screening;
- Continuous progress monitoring;
- Research-based interventions, that would include 1-1 tutoring;
- Progress monitoring during interventions; and
- Fidelity measures (Mellard, 2004).

Common attributes of RTI implementations are: a strong core instructional program for all students; multiple tiers of increasingly intense student interventions; implementation of a differentiated curriculum; instruction delivered by staff other than the classroom teacher; varied duration, frequency, and time of interventions; and categorical or non-categorical placement decisions (Mellard, 2004). This proactive model fits seamlessly into the EB broader approach to helping all struggling students through early interventions.

In many instances, this approach requires school-level staff to change their practice and cease functioning in silos that serve children in pullout programs identified by funding source for the staff member

providing the services (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 is a common-sense approach that could be second nature in schools, but in many cases schools have heretofore been rooted in a categorical culture that must be corrected through professional development and strong leadership from the district office and the site principal.

At the same time, there is some emerging evidence, using the national representative sample of students called the Early Childhood Longitudinal Study (ECLS), that full inclusion classrooms can have some negative spillover impacts on students without disabilities, particularly classrooms with students with significant emotional/behavioral problems (see for example, Fletcher, 2010 and Gottfried, 2014). The authors still sanction the inclusion model but suggest that teachers need training in both how to manage such complex classrooms as well as provide instruction in such mixed classrooms.

For children with more severe disabilities, clustering them in specific schools or at the SU/district level 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. Students in these categories generally include: severely emotionally disturbed (ED), children with intellectual disabilities and orthopedic disabilities and children within the autism spectrum. The ED and autism populations have been increasing dramatically across the country, and it is likely that this trend will continue in the future. To make the provision of services to these children cost-effective, it makes sense to explore clustering of services where possible and design cost parameters for clustered services in each category. In cases where students need to be served individually or in groups of two or three because of geographic isolation, it would be helpful to cost out service models for those configurations as well, but provide full state funding for those children. This strategy would reduce the likelihood of overwhelming the financial capacity of a small school district that happens to be the home of a child with a severe disability.

#### *On the Use of Paraprofessionals*

In many states across the country, undoubtedly including Michigan, school systems often use paraprofessionals to provide a significant portion of services to students with disabilities. As University of Vermont Professor Michael Giangreco argues, this strategy puts the least expert individuals in the role of providing instruction to the students with the most educational challenges and is not the most effective strategy. Giangreco (2015) further states that the use of paraprofessionals often occurs when schools do not have a proactive strategy for addressing the needs of students who struggle to achieve to standards and recommends, as does the EB model, the proactive approach.

Providing another example of heavy use of paraprofessionals, individual students with severe and profound disabilities, including many students with autism, often are provided the service of a 1-1 paraprofessional aide. These practices have been studied in great depth in Vermont. Studies have found that up to half of all paraprofessionals in Vermont might be assigned 1-1 to individual students (Giangreco, 2015; Shultz, et al., 2015). Although there are situations for which a student needs an individual aide, in many cases such aides can work to the inadvertent detriment of students (Giangreco. et al., 2005) implying that the use of paraprofessionals generally as well as in the 1-1 context should be discouraged and implemented only when absolutely needed.

As should be clear, the EB model aligns with these arguments and includes few paraprofessionals, except for some students with severe and profound disabilities. Instead, the EB model provides skilled teachers to provide the extra services needed by students who struggle to learn to standards as well as skilled teachers for the additional needs of students with disabilities.

#### *Census Approach to Funding*

The proactive approach to providing services to struggling students as well as students with disabilities has led to what is called the census approach to funding core special education services. The census method is accomplished by providing additional teacher resources at a fixed level. The census approach emerged across the country for several reasons:

- Continued rise in the number and percentage of “learning disabled” students and continued questioning by some of the validity of these numbers;
- Under-funding of the costs of students with severe disabilities;
- Over-labeling of poor, minority, and ELL students into special education categories, which often leads to lower curriculum expectations and inappropriate instructional services;
- Proactive approach to providing services to struggling students and the RTI system; and
- Reduction of paperwork.

The census funding approach for the high-incidence, lower-cost students with disabilities should be combined with a different strategy for the low-incidence, high-cost students, whose costs are funded separately and totally by the state (with the exception of basic education funding), as these students are not found proportionately in all districts. This is the catastrophic funding for school districts that provides resources for special education students who require services exceeding some figure (after Medicaid, federal special education grants, and other available third-party funding are applied).

Today, diverse states such as Alabama, Arkansas, California, Massachusetts, Montana, North Dakota, Pennsylvania, and Vermont all use some version of census-based special education funding systems. Moreover, all current and future increases in federal funding for students with disabilities are to be distributed on a census basis.

The issue then becomes the staffing standards for the various categories in special education:

- Students with mild and moderate disabilities;
- Students with severe and profound, and high cost-to-serve, disabilities;
- Related services; and
- Costs associated with developing and continually reviewing IEPs.

Each of these is addressed below.

As background, however, the study team conducted this analysis by making an assumption that 25 percent of the 16 percent incidence of students with disabilities in Michigan could be serviced by the EB model’s extra help resources: core tutors and school counselors, and additional tutors, pupil support, extended day, summer school and ESOL resources. This would bring the percentage of students needing and triggering additional special education resources to 12 percent.

### *Mild and Moderate Disabilities*

At an incidence rate of 12 percent, it would be reasonable to assume that one to two percentage points of that total would be for children with severe and profound disabilities. That would leave 10 percent with mild and moderate disabilities. Although the previous EB provision for resources for students with mild and moderate disabilities was one teacher and one aide for every 150 regular students, the study team is revising that via the following analysis.

The service load for special education teachers for mild and moderate disabilities ranges widely across the country, with some school districts setting the load at 15 and others at 30. And there is no national legal requirement for service loads, or to our knowledge, a national standard. The following analysis assumed special education teachers service an average of 20 students with mild and moderate disabilities, which is at the lower end of the range. If the incidence of such students is 10 percent, that means about 15 students of every 150 students would have a mild or moderate disability. The EB formula then needs to be modified to provide 0.75 special education teacher positions for every 150 students (the 0.75 is determined by dividing the number of mild and moderate special education students in a group of 150, which is 15, by the service load for a teacher, which is 20). The 0.75 special education teacher position is equivalent to one teacher position for every 200 students, to align the teacher allocation to a 10 percent incidence, or five positions for every 1,000 students.

Nate Levenson (2011, 2012), a national expert on effective special education servicing, also recommends, as does the above discussion, that most of the services needed by students with mild and moderate disabilities should be provided by skilled teachers, not by less skilled special education aides. In fact, he argues that places with many special education aides serving students with mild and moderate disabilities usually work in educational sites that have few preventive services like the EB model provides. Thus, the argument is that few – if any – aides are needed for students with mild and moderate disabilities.

The aides used by many if not most schools across the country frequently focus on behavioral issues. But rather than having aides work individually with students on behavioral issues, what is needed is a teacher behaviorist, who works with teachers to develop their skills to manage classrooms even with students with behavior challenges, including students with autism. Some of the best private schools for students with autism do not have any aides in the classroom, but the teachers are skilled in classroom management and behavior strategies. The EB model proposal is to provide one teacher behaviorist for every five special education teachers. This equates to a formula of one behaviorist teacher for every 1,000 students.

The above analysis produces an ED recommendation of five special education teachers and 1 teacher behaviorist, or a total of six teacher positions, for every 1,000 students.

### *Related Services*

Related services include the need for speech/hearing pathologists, occupational therapy (OT), physical therapy (PT) and other services required for a student to benefit from special education services. The incidence of related services is generally half of that for mild and moderate disabilities, or five percent in this case. Further, related service personnel usually service 45 students needing these kinds of related services.

A group of 1,000 students, at an incidence of five percent, would have 50 students needing related services, meaning the need for related services staff per 1,000 students would be 50/45, or 1.1 related services staff positions.

This brings the total special education services staff for 1,000 students to 7.1, the sum of six positions for mild and moderate disabilities and an additional 1.1 for related services.

#### *Psychologists*

Finally, districts need psychologists for the primary role of overseeing the development and continued review of Individual Education Programs, which must be reviewed and reassessed every three years. A typical standard for psychologists is developing 75 IEPs a year. At a special education incidence rate of 16%, a group of 1000 students would have 160 who needed an IEP. As IEPs are reviewed every three years, that reduces the burden to 53. On the other hand, for every 1000 PreK-12 students, there typically is the need to administer an IEP review process for an additional 20 or so students for incoming preschoolers, kindergartners and first graders, many of whom would need the review but most of whom would not actually receive an IEP. This adds to the 53 another 20 IEP reviews for a total of 73. Thus, at a typical load of 75, a group of 1,000 K-12 students would trigger the need for an additional one psychologist.

#### *Severe and Profound Disabilities*

The EB approach for children with severe and profound disabilities is for the state to fund 100 percent of the costs for students with severe and profound disabilities, minus federal Title VIb and the cost of the basic education program. To control costs for this recommendation, the EB model would limit the number of students so covered to 2 percent of students in the district or SU.

Total EB recommendation for special education:

1. 8.1 positions for every 1000 students, which includes:
  - 7.1 positions per 1,000 students for services for students with mild and moderate disabilities and for the related services of speech/hearing pathologists and/or OT PT, which equals approximately one position for every 140 students, and
  - one psychologist for every 1,000 students.
2. 100 percent state funding of services for students with severe and profound disabilities, minus federal Title VIb funds and the basic education program, capped at 2 percent of all students.

### **Staff Compensation Resources**

There are several other issues related to the Michigan Funding system that are not individual elements of the model, but integral aspects of costing the model. These issues include: salary levels, health insurance, other fringe benefits, regional cost adjustments, external cost adjustments and the school district school finance audit process.

#### **29. Staff Compensation**

To cost out the above recommendations, one needs to identify a compensation amount for each staff position. Compensation includes salary as well as benefits. Benefits include Social Security and

Medicare, health insurance, retirement or pension costs, Workers' Compensation and Unemployment Insurance.

Model Element	Michigan Evidence-Based Recommendation
29. Staff Compensation	For salaries, average of previous year For benefits: Retirement or pension costs: 4.6% Health Insurance: \$12,000 per employee Social Security 6.20% (up to annual earnings of \$127,200) Medicare: 1.45% Workers' Compensation: 0% Unemployment Insurance: 0.6%

As is usually done in most adequacy studies, the EB approach to costing out the above recommendations is to use the average of the previous year's staff salaries to put a salary "price" on each staff element of the funding model. Staff would include the major certified categories such as teacher, principal, superintendent, assistant superintendent, as well as the major classified categories such as secretary, custodian, maintenance worker, groundskeeper, and supervisory aide.

In some cases, adequacy studies explicitly include a market analysis of salaries, for example, comparing teacher salaries to salaries of workers in other occupations with similar skills and competencies to teaching. These market analyses, however, are not part of the current study. Therefore, average salaries from the preceding year will be used as the salary price to cost out the various staff elements of the model in the process of identifying both a new base per student figure and appropriate pupil weights or dollar per student figures for ELL, non-ELL poverty students, and special education.

Benefits present a set of issues that need to be addressed in more detail. Benefits generally include:

- Social Security and Medicare;
- Health insurance;
- Retirement or pension costs;
- Worker's compensation; and
- Unemployment insurance.

These are usually calculated as a percent of salary.

For example, today Social Security and Medicare costs are 7.65 percent of salary, but Social Security applies only to incomes up to \$127,200.<sup>18</sup> There is no income cap for Medicare taxes.

Health care insurance costs pose a more complex challenge. Costs of health care insurance often vary substantially across districts, which usually have different approaches to covering health care, including self-insurance. Rates often differ for individuals, couples, and families. Typically, the state does not explicitly state its fiscal responsibility for health insurance costs for school district employees, and

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<sup>18</sup> This will increase to \$128,400 for 2018.

typically unspecified amounts for such coverage are included in the base school funding formula. Moreover, many states' school funding formulas under-support actual health care insurance costs.

But health care costs need to be directly addressed in an adequacy study, to ensure that this part of the compensation is “adequately” reflected in any cost figure. A recent study in North Dakota found that the state average cost for health insurance for all *state* employees was about \$12,000. Though the state had not explicitly adopted a policy of health care coverage for school district employees, the decision was made, with the assent of the legislative committee for which the study was conducted, to use the figure used for state employees as an “indirect” indicator of how the state would recognize health insurance costs in the school aid formula. This decision was bolstered by a previous state policy that allowed school districts to “opt into” the state health care program. Thus, in calculating a new per student figure for North Dakota, the \$12,000 state figure for health insurance costs was used for all staff categories. Wyoming also uses a state health insurance cost figure in its K-12 school aid formula.

Michigan districts spend an estimated \$12,000 per employee for health insurance and that figure is used in this analysis.

Retirement costs generally are set by the state. In some cases, the state pays pension costs directly to the retirement fund, and that cost is not included in local district costs. This is a straightforward way to cover pension costs, but advantages high salary over lower salary districts. Nevertheless, Michigan pays 11.04 percent “off the top” for unfunded pension liabilities. In addition, Michigan requires districts to pay 25.56 percent of salaries for ongoing pension costs. The EB approach to compensation typically adds the cost of pensions for all educators and education staff. Generally the percentage used is the figure the state requires districts to pay which is 25.56 percent for all staff. However, for the purpose of this analysis, we have used 4.6% of salary for ongoing pension costs. The balance of the costs are real and need to be included in the total, but because pension costs vary for charter schools and depending on the employment date of each employee, the 4.6% figure was used and the balance will be included in the discussion of total costs for the PK-12 education system elsewhere in this report..

The model uses a figure of 0.6 percent for Unemployment Insurance, the current average across districts. For Workers' Compensation, the model uses zero percent because the state fully reimburses districts for these costs.

## ***Evidence-Based Professional Judgment Panels***

### **Introduction**

As part of the Evidence-Based (EB) approach to estimating school finance adequacy, the study team conducted four Professional Judgment (PJ) panels across Michigan in October 2017. The purpose of these panels was to seek input from educational professionals on the content and elements of the EB model described previously in the “Using the EB Model to Identify Adequacy for Michigan Schools” section. At each of the panel meetings the study team shared the elements of the EB model, asked the panel members to reflect on those elements and provide us with Michigan-specific assessments as to how the element could function in Michigan. Based on this feedback, the study team identified several areas where adjustments to the EB model might be considered in estimating an Evidence-Based level of school finance adequacy, as well as several areas where the EB model would not need to be changed.

This section describes the outcomes from the four Evidence-Based PJ (EBPJ) panels. The study team used the recommendations of those panels to refine the EB model so it more accurately reflects the issues and context of Michigan. During panel meetings, the study team walked panelists through each of the elements as described previously (and summarized in Table 3.1). There were three general responses to each model element from the EBPJ panels:

1. For some elements, panel members recommended changes in the level of resources needed by Michigan schools – suggestions with which the study team agrees and have incorporated into the Michigan EB model.
2. For other elements, the panels recommended changes where the study team’s reading of the evidence and best practices diverged from the panel recommendations. In these instances, a detailed description of the differences between the EB model and the panel recommendations is provided, the rationale for the EB recommendations is documented, and information is provided for state policymakers to enable them to determine their preferred approach.
3. For the remaining elements, panel members agreed that the proposed EB model resources were adequate to support Michigan schools as they seek to attain the state’s desired educational outcomes.

The Excel-based simulation that accompanies this report makes it possible for stakeholders to model alternative recommendations in real time and review alternative cost projections based on those alternatives. In cases where the study team believes evidence does not support panel recommendations, Michigan policymakers may want to estimate the costs of the panel recommendations and consider modifying the EB recommendations. The simulation model allows them to make such changes and to understand the impact those changes would have on the base cost of education and the related pupil weights.

### **Evidence-Based Professional Judgment Panels**

Four Evidence-Based Professional Judgment (EBPJ) panels were held in Michigan: one in Gaylord on October 23, one in Ann Arbor and another in Southfield on October 24, and one in Grand Rapids on October 25, to ensure representation from all regions of the state. Approximately 20-25 panel members attended each EBPJ panel meeting. Education community stakeholders and school officials nominated panelists, and all nominated individuals were invited to attend a panel meeting. The study team specifically sought to include a range of school staff at each EBPJ session.

A goal was to have half of the members of each panel be teachers from different levels of schools (elementary, middle, and high school) as well as teachers with varying work assignments including core subjects, elective classes, special education, English for speakers of other languages (ELL), and others. The study team wanted teachers with experience in helping to improve student performance in schools, that experience would make them particularly helpful in understanding the resource implications of programs to meet new Common Core and college and career ready state standards. The study team also sought lead teachers, mentor teachers, instructional coaches, and certificated personnel serving in the role of tutors.



In addition to teachers, the panels had participation from: school site administrators at all school levels; various central office administrators including superintendents, assistant/associate/deputy superintendents, curriculum directors, special education directors, and business managers; and representatives from school districts and Intermediate educational agencies.

Several days prior to the meetings, all EBPJ panel members received an e-mail outlining the purpose of the panel meetings along with an electronic copy the draft EB report. EBPJ panels met for an entire day, starting at 9:00 in the morning and ending around 4:00 in the afternoon. Each panel was supported by either Allan Odden or Lawrence Picus from Picus Odden & Associates, and an additional staff member from APA. The study team presented an overview of the EB model and then sought input – model element by model element – regarding the appropriateness of the model’s resources for Michigan schools. The study team also solicited panel members’ views on how the allocation of those resources could improve student learning. The findings from each of the four panels form the basis for the findings presented in this section.

The balance of this section describes six overall themes that emerged from the EBPJ panels, then describes the recommendations of the EBPJ panels regarding each element, starting with the elements where the study team concurs with recommended changes, and followed by the elements where we document our recommendation to continue with the EB model resource allocation strategies and finishing with the elements with which the panels felt the EB model resource allocations were adequate as proposed.

### **Professional Judgment Panel Recommendations**

Six overall themes emerged from the panel conversations:

1. Panelists largely supported the overall structure and intent of the EB approach to instructional improvement, student achievement, the embedded school improvement model, and school finance adequacy. Suggested changes were at the margin but not the core of the EB approach.
2. Panelists expressed strong and universal support for the overall instructional elements of the EB model. Those elements – small class sizes, core and elective teachers, instructional coaches, intensive and ongoing professional development, extra resources to provide more instructional time for struggling students, teachers organized into collaborative work teams, etc. – were viewed as on target and reinforcing the delivery of best practices in schools.
3. Panelists universally noted that the staff and resources in the EB model exceeded existing resources in nearly all schools, and that many of the instructionally focused staff were those that were very much needed (e.g., instructional coaches) but had been cut over the past few years as budgets declined.
4. There was initial concern that the EB approach to serving students with disabilities was problematic and provided less than current resources for those students, but following considerable detailed discussion, panelists agreed that the EB approach was quite robust and an effective approach for serving students with disabilities. The major area of concern was the state’s birth to age 26

requirement for serving students with disabilities while the EB model covered only preschool (age three and four) to grade 12 students (though at higher ages if still attending high school).

5. There was virtually no pushback to the substantially fewer paraprofessionals in the EB model than are typically employed in most schools. Most panelists agreed that skilled teachers provide more effective services than paraprofessionals – even trained paraprofessionals – but cautioned on the need for time to shift from paraprofessionals to skilled teachers for many extra help services.
6. Panelists noted that Michigan typically provides more school administration than the EB model but less instructional leadership staff.

As indicated above, EBPJ panel recommendations fell into three categories:

1. Areas where the panelists recommended changes that we believe have a sound evidence basis and have been incorporated into the EB model.
2. Areas where panelists recommended that the study team consider changes or identified potential concerns with the EB model, but for now have not been changed in the EB model.
3. Areas where panelists were in general agreement with the EB model recommendations.

Each of these areas is considered below, identifying the EB model elements in each section that are impacted.

#### Areas Where EBPJ Recommendations Led to EB Model Changes

There was only one major area where EBPJ panel recommendations suggested a strong reason to modify the EB model as presented to the panels: central office administration. In two other areas, the panels suggested modest changes that were adopted: field trips for preschool students and higher curriculum costs for programs for struggling students.

##### *Element 21: Central Office*

The study team told all panels that the EB model's approach to central office staffing would be prorated up and down, on a dollar per student basis, for districts larger and smaller than the prototypical central office of 3,900 students. In all panel sessions, panelists suggested that while they would like the level of staff in the initially proposed central office model, they nevertheless felt the staffing was more than needed. The study team explained that the EB central office model had grown over the past several years because of increased district assessment and evaluation responsibilities, and expanded technology systems at both the district and school level. Panelists agreed, but nevertheless suggested that the model be slimmed down, and the study team agreed to do so. Table 7 represents the revised EB Central Office model and compares our revisions with the data presented earlier, in Table 6. Note that the major changes are in the reduction of support staff as those had been the prime source of the increased number of positions.

**Table 7: EB Central Office Staffing for a District with 3,900 students**

Office and Position	FTE		FTE		FTE	
	Previous EB Model		Current EB Model		Revised EB Model	
	Admin.	Classified	Admin.	Classified	Admin	Classified
<b>Superintendent's Office</b>						
Superintendent	1		1		1	
Secretary		1		2		1
<b>Business Office</b>						
Business Manager	1		1	1	1	
Director of Human Resources	1		1	1	1	
Accounting Clerk		1		2		2
Accounts Payable		1		2		2
Secretary		1		1		1
<b>Curriculum and Support</b>						
Assistant Supt. for Instruction	1		1		1	
Director of Pupil Services	1		1		1	
Dir. of Assessment and Evaluation	1		1		1	
Secretary		3		3		3
<b>Technology</b>						
Director of Technology	1		1		1	
Network Supervisor (Hardware)		1		1		1
Systems Supervisor (Software)		0.3		1		1
School Computer Technician		1		4		2
Secretary		1		2		1
<b>Operations and Maintenance</b>						
Director of O&M	1		1		1	
Secretary		1		2		1
<b>Central Office Staffing (3,900)</b>	<b>8</b>	<b>10</b>	<b>8</b>	<b>20</b>	<b>8</b>	<b>15</b>

*Element 1a: Preschool student activities*

In discussing student activity resources, several panelists noted that preschool programs also take students on field trips and that there should be some modest funds for such activities. The study team agreed and added \$50 per student in the student activities line for the EB preschool model.

### *Element 15: Instructional Materials*

Several panelists noted that programs for students struggling to meet standards needed extra resources for aligned supplemental curricular programs. For example, one online reading program for ELL students, Imagine Learning, costs \$100 per student per year. Other districts identified other extra help programs, such as Read 180. Thus, supplemental materials allocation for poverty students, ELL students, extended day and summer school was increased to \$50 per student.

### Areas Where EBPJ Panels Recommended Potential Changes That are Not Included in the Core Evidence-Based Model

PJ panelists offered suggestions regarding four elements of the EB model that have not been incorporated into the study team's recommendations. Those recommendations are described here, and remind readers that in all cases, the Excel simulation of the Michigan EB model can be used to estimate the impact of these changes on the per student revenue. The four elements are:

1. School level administration;
2. Instructional materials and computer technologies;
3. Career and technical education equipment; and
4. Special education.

### *Element 11: Principals and Assistant Principals*

The EB model provides one principal for every prototypical elementary, middle school, and high school, and in addition provides one assistant principal for a 600-student high school.

The EBPJ panels felt strongly that all three prototypical schools (450 student elementary, 450 student middle and 600 student high school) should be resourced with an additional assistant principal, arguing that the 450-student elementary and middle schools should have both a principal and an assistant principal, and that the 600 student high school have a principal and two assistant principals. Panelists provided several arguments to support this recommendation including: the fact that traditionally more school administration has been provided in Michigan; administrative needs have grown given the rising and more difficult educational and disciplinary needs of children; and, the need for time to engage in more performance-oriented teacher evaluation systems.

Because the EB model provides substantial instructional leadership resources in the positions for instructional coaches, it provides fewer resources for school administration per se. The rationale is that while each school's leadership team needs to provide both school management and instructional leadership functions, the EB school administration staff combined with the robust instructional leadership staff (e.g., the instructional coaches) provide sufficient school leadership/management resources. And with respect to student disciplinary needs, the EB model also provides substantial pupil support staff, as well as additional pupil support staff for schools with poverty and ELL students. With this combination of school leadership/management staff and the considerable counseling and pupil support staff, the EB model posits that an effective schoolwide student management and disciplinary system can be implemented. Further, higher poverty schools, perhaps with more intense student discipline issues, could allocate a pupil support position for a "dean" position focused on student discipline. Indeed, several

schools in the various panels did organize its administrative staff this way. This use of staff would be allowed by and resourced by the EB model.

Therefore, it is the study team’s recommendation that the EB model does not need to provide more administrative staff.

One qualification to this recommendation is that if schools and districts adopt teacher evaluation strategies that require multiple live observations of teachers over the course of a year – which is needed if such systems are to obtain fair and accurate data on a teacher’s instructional practice – then additional staff are needed to conduct these observations. Although the EB model does not address teacher evaluation explicitly, the study team would argue that there are more efficient and more effective ways to structure performance-based teacher evaluations than multiple principal observations (Grissom & Youngs, 2016; Odden, 2011a). If Michigan prefers this more expensive approach to teacher evaluation, it could provide the additional administrative staff to each prototypical school, which would produce a higher base per student figure.

*Elements 15, 16 and 17: Instructional Materials, Interim, Short Cycle Assessments, and Instructional Technology*

The EBPJ panelists were generally supportive of the EB model allocations of \$190 per student for instructional materials, \$25 per student for formative and short cycle assessments, and \$250 per student for school-based technology. Most of the school business officers on the panels indicated this was more than is currently expended in these three categories.

To ensure that districts and schools are not engaging in “over testing,” the EB recommendation for short cycle assessments is that no more than \$25 per student be allocated as a way to encourage schools to purchase just one, integrated, online battery of such assessments, rather than multiple additional assessment systems.

Some panelists in three of the panels noted that they were spending much more for current textbook adoptions. For example, one school said it had paid \$286 per student for an adoption of algebra I, algebra II and geometry textbooks. These adoptions included all the supplementary materials as well as a CD and online access that provided additional instructional support. Another school had spent close to \$1,000 per student on a reading program for elementary schools, which also included several supplemental materials as well as “leveled” readers. A different elementary reading program, Read Well, cost one district \$220 per student for the texts, supplies, supplemental materials, and online resources. A fourth district spent \$500 per student for an Advanced Placement biology course. Ann Arbor had adopted the Lexia Learning program, a K-3 reading program for struggling students, at a cost of \$184 per student. Some districts are spending substantial sums for new textbook adoptions at cost levels the study team heretofore never encountered. Also, “electronic” copies of textbooks often require hard copy adoptions as well, so produce no cost savings.

Some new curricular materials are also available at no cost from more than one source. For example, Engage New York was the result of a New York State initiative to create curricular materials linked to the Common Core Standards and all the materials are available online for free. A second example is the

curriculum materials that are available – at no cost –from the organization that developed the Next Generation Science Standards. These science materials receive high marks for their quality.

The study team is therefore reluctant to increase the EB’s allocation for instructional materials. Many, if not most, districts in Michigan spent less than the \$190 per student in the EB model, as do nearly all districts in other states where the EB study team has conducted adequacy studies during the past five years. However, Michigan would be wise to probe the reasons why some districts spend so much on curricular materials. If those materials produce better student achievement results, the state should consider supporting those materials and increase the EB allocation in this area. But if not, districts should be encouraged to purchase lower cost but effective curricular materials.

A similar issue raised by several panelists was the district’s responsibility for purchasing college texts, which are quite expensive, for students accessing the “dual enrollment” program. Some students take up to three courses, with texts for each – that must be purchased each year – costing from \$100 to \$200 each. As dual enrollments increase, it could be that at some point the high school textbook allocation would need to be enhanced to cover these higher costs.

Finally, Michigan is on a path to leverage technology for learning, to empower every student in the state to excel at next generation assessments, and to achieve lifetime success in a technology-based, global economy. These aspirations might at some point require more computer technologies than the EB model provides. Several panelists noted this aspiration and argued that the EB model’s technology recommendations should be enhanced. As noted earlier, for the computer and technology allocation to be sufficient for Michigan to move to a one-to-one computer ratio for all students, the base \$250 per student would need to be increased by \$150 per student to \$400 per student. If Michigan decides to take this path, then the ultimate base per student number from the core EB model would need to be increased by \$150.

One large ISD provides computer-based technologies for schools on a county-wide basis and uses a figure of \$250 – the EB amount – to provide the equipment that includes computer devices, operating systems, software needed for various applications and spy/security software. Another ISD used a figure closer to \$300 per student.

At this point, the EB model does not support a one-to-one computer ratio and concludes that it is a bit premature to do so given the mixed evidence on its impact on student achievement. But that does not mean the state could decide to move in that direction, in which case, the base per student number would need to be increased by \$150 per student.

#### *Element 18: Career and Technical Education*

In Michigan, career and technical education programs are provided both by Intermediate School Districts, usually with a special mill levy for the program, and by local districts. For the latter, it often, if not always, is the case that their ISD does not have a special CTE mill levy and provides few if any CTE programs. Michigan also has a complex approach to provide state aid for CTE programs.

In some EBPJ panels, panelists identified CTE programs with equipment costs that were quite high, sometimes approaching \$50,000 for some high cost programs. In these panels, most of the CTE programs

were provided by ISDs and most ISDs provided a wide range of programs including advanced manufacturing, graphic art, computer programming, robotics, accounting, welding, etc.

It is the consensus view that most state-approved career and technical education (CTE) programs often cost more to operate than non-vocational programs due to such factors as:

- Smaller classes;
- Specialized equipment;
- Supplies;
- Specialized supportive services; and
- High-quality instructors with specialized certifications.

However, during the discussions, it became clear that the bulk of these costs are included in the EB base program, including class sizes (25 in the EB model), supplies, and professional development. Thus, the major added costs would be those associated with specialized equipment. While some programs might have high equipment costs (e.g., robotics), others do not (e.g., accounting). Even though many panelists argued that the EB allocation of \$10,000 per CTE program (which would include five one-hour sections a day) was too low, it is the study team's conclusion that across all CTE programs the \$10,000 figure would be adequate. High equipment costs for some programs would be balanced by lower equipment costs for others; and equipment for all programs last over several years so even a program with equipment needs of \$50,000 would have sufficient funding assuming the equipment would last for five years.

Thus, the study team continues to recommend that the EB CTE allocation of \$10,000 per all CTE programs is adequate. Michigan should reassess its overall structure for CTE programs. While some ISDs adopt a special mill levy for CTE programs, others do not, so there certainly are inequities in the accessibility of CTE programs from the student perspective.

#### *Element 28: Special Education*

The EB model provides one teacher position for every 141 students in a school (total students, not only special education students) as well as the allocation of positions at the central office to oversee development and implementation of IEPs. In addition, the model recommends that the state fund 100 percent of the costs of students with severe and profound disabilities – the high cost students. In the MARS report, these would be the student categories of: severe cognitive impairment, severe emotional impairment, homebound and hospitalized services, severe multiple impairments, and perhaps some programs for students with severe autism.

This full state funding would be capped at two percent of total school enrollments across the state. In addition, the EB model recommends special education funding should be net of Federal Title VIb funding.

Nearly all panelists felt at the beginning of the discussion of this topic, that the EB model would not be sufficient for the Michigan special education standards and service levels, and because of the state's mandate to provide special education to all persons from birth to age 26. In terms of the latter, the EB model only covers students aged three and four, who would be in preschool, and the all students in kindergarten through grade 12, so it falls short of the state's birth to age 26 special education mandate.

At the same time, when panelists who were special educators and/or directors of special education to reviewed the service levels outlined in the special education section, it turned out that all districts represented, as well as we believe the MARS standards, had larger service levels than the EB proposed. After realizing these discrepancies, panelists understood how the overall EB approach to special education worked and supported it.

The panel discussions about special education were closely linked to the discussion of strategies for struggling students. The research behind the EB model includes multiple resources for educators to provide for Tier 2 interventions – tutoring, extended day, summer school and extra pupil support – *before a student is given an IEP*. The model also considers those resources in combination with the resources in the special education element to address the issues of all students who need extra help to learn to standards. Further, the substantial Tier 2 resources, if provided as preventative extra help before a student is given an IEP, have been shown over time to reduce the need for special education services. As a result, the EB model puts more resources into these Tier 2 strategies and less into special education under the theory that the combination of resources can be used to address the needs of all struggling students, those in and those not yet in a special education program.

Initially, many panelists observed that the EB special education allocation would result in fewer educators providing extra help to struggling students, including students with IEPs, then are currently employed in their schools. Some panelists struggled with considering the special education resources in combination with the multiple and additional extra help resources – tutoring, extended day, summer school, and additional pupil support.

However, when panels discussed examples that showed how to meet the needs of students who require extra help – both those with and without an IEP – several panelists noted that the EB allocations provided more resources than their schools currently had, leading to a conclusion that the combination of extra help resources and special education resources were adequate.

A few of the panelists agreed with the assertion that effective use of more preventative Tier 2 programs along with early intervention supports embedded in the EB model – preschool, small K-3 classes, multiple Tier 2 interventions including tutoring by certificated personnel – can reduce the number of students who require special education services and that the academic struggles of many students are best addressed before and without an IEP (which is made possible by the EB approach). This perspective aligns with the theory of action embedded in the EB model and drives the logic behind the way resources are allocated in the model. This leads us to reaffirm our recommendation of one teacher position for every 141 students, which covers services for students with moderate and mild disabilities, related services (OT, PT, speech and hearing help), and behaviorists to help teachers and schools implement a school-wide strategy of behavior and discipline.

It is important to note that the PJ panels supported the concept of full state funding of programs for students with severe and profound disabilities and argued that it would be important for the state to develop rules and regulations to identify these students and programs.



Finally, representatives from the Flint school district noted that their special education identification rate was close to 23 percent, nearly twice the state average. This is a result of the tainted water supply in that district, and the phenomenon of large numbers – thousands of families and students – moving out of the district, leaving those who remain with both a greater incidence of disability as well as more intense disabilities. The state could consider Flint a special case and fund all special education costs above that generated by the EB model until the situation is controlled and the identification rate is reduced to numbers similar to other districts.

#### Areas where EBPJ Panelists Agreed with the EB Model Recommendations

For most of the elements of the EB Model, the EBPJ panelists generally agreed the resources allocations were adequate for providing the resources schools needed to give all Michigan students an equal opportunity to meet state performance standards. Each of those elements is listed below together with pertinent comments from the panels.

##### *School Prototypes*

The panelists generally supported the use of school prototypes – 450 student elementary school, 450 student middle school, and 600 student high school – as well as the prototypical district of 3,900 students including four elementary schools, three middle schools, and two high school, to both show how all elements of the EB model play out at the school level and to calculate a base dollar per student figure.

##### *Element 1a: Preschool*

The panels supported the EB model recommendation of one teacher and one instructional aide for each group of 15 students for a preschool program. Several panelists mentioned that a full-fledged preschool program could help acculturate to formal schooling many students who have been entering kindergarten with significant behavioral and social issues, in addition to laying a foundation for learning.

Michigan’s Early Childhood Standards of Quality require class sizes of 16 with two adults. The EB model is a bit more specific, providing not only two adults for classes of 15 students, but more specifically a fully licensed and trained teacher as one of those two adults. Michigan’s early childhood standards also support a PreK-grade 3 integrated approach to early education, a focus that is also part of the EB model.

Michigan currently has a developmental “kindergarten” program for “young” five-year-olds. If the state adopted a full-fledged preschool program as included in the EB model, it would no longer need the developmental kindergarten programs as those students would all be eligible for the PreK services.

The EB model provides not only the one teacher and one aide for every 15 students in its prototypical preschool program, but also the elective teachers (so preschool teachers in a PreK-3 setting can engage in collaborative work with other early elementary grade teachers), instructional coaches, counselors and nurses, professional development, instructional materials, assessments, and technology resources that are provided to elementary schools.

#### *Element 1b: Kindergarten*

The panels supported the EB model recommendation of one teacher for 15 students in a full day kindergarten program. As well known, Michigan already supports a full day kindergarten program.

Some panelists would urge the state to take a more proactive approach to requiring all students to attend a preschool as well as full-day kindergarten program, so that they would be better prepared to enter first grade fully prepared for academic work and appropriate school behavior.

#### *Element 2: Core Elementary Teachers*

The EB model provides core elementary teachers at the ratio of one teacher position for every 15 students in kindergarten through grade 3 and one teacher position for every 25 students in grades four and five allocation averages to approximately one teacher for every 17 elementary students in a typical K-5 elementary school. Panelists supported these class size ratios. Many panelists stated that their current elementary class sizes were larger than these numbers, and had risen during the past decades because of required budget cuts.

#### *Element 3: Core Secondary Teachers*

The EB model provides core secondary teachers at a ratio of 25 students per teacher in all middle and high schools, generally grades 6-12. The PJ panels supported this recommendation.

It should be noted that nearly all panelists noted that their current actual class sizes were much larger than the EB model of 15 and 25. One panelist stated that these smaller class sizes would “solve all their education problems.”

#### *Element 4. Elective Teachers*

The EB model provides elective teachers to prototypical schools at a rate of 20 percent of elementary and middle school core teachers and 33.33 percent of core high school teachers. The combination of core and elective teachers allows every school in Michigan – elementary, middle, and high school – to provide a full liberal arts curriculum program, to provide a curriculum for both college and career ready focused students, and to have a focus on both what the EB model labels “core” courses (mathematics, science, reading/English/language arts, social studies and world language) and other subjects such as art, music, physical education, and career-technical education.

With this mix of staffing, the EB model provides for five 60-minute daily periods of pupil free time for elementary and middle school teachers. The high school elective allocation allows high schools to organize using a block schedule with four 90-minute blocks each day and allows for teachers to teach during three blocks and have 90 minutes each day for individual and collaborative planning (this time period also could be organized as two 45 minute periods).

In viewing the issue of core and elective teachers, the challenge is to ensure that this staffing of schools allows for sufficient time for both individual planning and preparation and for collaborative teacher teamwork. Most of the panelists stated that the EB staffing allocations would be adequate to provide such collaborative time.

Many panelists, however, argued that given the onset of Common Core/College and Career Ready academic standards, middle schools are becoming more like high schools and should have a 33-1/3 percent allocation for elective teachers, just as high schools have. This obviously would increase costs.

During the discussions of how sufficient collaborative time could be structured, it became clear that the issue required understanding both the student's typical day and the teacher's typical day. The student day is usually six and a half hours, with six hours of instruction and 30 minutes for lunch. The teacher day is most commonly seven hours, or an additional 30 minutes, with five hours of instruction, 30 minutes for lunch, 45 minutes for planning or meeting, and 15 minutes for opening and closing the school day. It is difficult to find 45 minutes a day for collaborative time as well as 45 minutes for individual planning and preparation, in a seven-hour work day.

But extending the teacher work day to seven and half hours solves this dilemma. Given this longer day, Michigan principals could straightforwardly organize school days so that all teachers – elementary, middle, and high – could have at least 45 minutes of pupil free time during the regular day and at least 45 minutes of pupil free time after the instructional day, both of which could be organized in various ways to ensure adequate time for individual teacher planning and preparation and daily teacher collaborative time. The EB model's goal is to have 45 minutes of teacher collaborative time daily, because teacher collaborative work is a key to improving student performance in virtually all studies of schools that have moved the student achievement needle.

In sum, most panelists supported the EB elective allocation of 20 percent elementary, 20 percent middle school and 33 1/3 percent high school. If, however, these staff allocations together with a seven-hour teacher work day created problems in providing sufficient collaboration time, the state could lengthen the typical teacher work day by 30 minutes, from seven to seven and half hours. This would require a seven percent increase in teacher salaries. Alternatively, the state could increase the middle school elective teacher allocation to 33 1/3 percent.

#### *Element 5: Instructional Coaches*

This EB model recommendation for instructional coaches was strongly supported by panelists, who indicated that the allocation of one coach for every 200 students generally was higher than is now provided to schools. Panelists agreed that coaches are critical for supporting collaborative time and professional development to improve instructional practice. Panelists also noted that instructional coaches are a needed staff resources to effectively implement the state's third grade reading initiative.

Several panelists noted that instructional coaches needed specific professional development to execute the coach role effectively. In response, the study team noted that as all instructional coaches in the EB model are considered teachers, and thus trigger ten days of annual professional development. As noted below in the section on professional development, providing this number of pupil-free days for professional development would require extending the average teacher's work year by five days so that the typical contract would include ten pupil-free days for professional development, as compared to the estimated average of just five days today.

Several panelists also suggested that it would be wise for the state to affirmatively launch programs to develop and train instructional coaches. The study team agreed with that suggestion and stated that several groups – the state department of education, administrator, and principal associations as well as teacher unions – could take on that role. Panelists shared that the General Education Leadership Network of the Michigan Association of Intermediate School Administrators was one group that has already implemented such an instructional coach development and training program.

Although panelists were not asked if instructional coach funds should be included in a foundation block grant or separated as a categorical program, if the EB study team were asked, it would recommend that the state make funding of coaches a categorical program. This would help to ensure that instructional coach funds were actually used to hire and deploy instructional coaches. The study team’s research in other states has shown that when funding for coaches is not dedicated, up to half of coaching funds are diverted to other expenditure items and coaches are in short supply.

#### *Element 6: Core Tutors*

The EB model provides one core tutor for each prototypical school. The PJ panels supported this recommendation, agreeing that there will be students in every school who struggle to achieve to the new higher Common Core standards and this extra help strategy is important to providing all students an equal opportunity to meet the new and more rigorous standards.

Some panelists urged the EB model to use the term “Tier 2 interventionist” instead of tutor; the EB model acknowledges this perspective but as noted previously, tutors, teachers in extended day and summer school are all part of Tier 2 resources the model provides. The EB model continues to support one-to-one tutoring in the early elementary years as the most effective, initial Tier 2 intervention.

#### *Element 7: Substitute Teachers*

The recommendation that substitutes be provided at the rate of five percent of all core and elective teachers as well as for instructional coaches, tutors, special education, extended day and summer school teachers was supported. School business officers who attended the panels indicated this would be sufficient.

#### *Elements 8 and 24: School Counselors*

The standard EB model provides one school/guidance counselor for every 450 PreK-5 students and one school counselor for every 250 students in grades 6 through 12.

As noted at the panel meetings, the EB model provides not only core guidance counselors and nurses, but also additional pupil support staff based on the incidence of poverty and English language learner (ELL) students. In addition to core school counselors the EB model provides an additional counselor for every 125 ELL students as well as for every 125 non-ELL poverty students. These additional positions could be a school counselor, social worker, family liaison, disciplinary dean, etc. Indeed, combining core school counselors with this additional pupil support allocation, the EB model provides more of these support staff than are employed in several districts, including many high poverty impacted districts, represented at the EBPJ panels.

Behavioral problems were also identified as challenging issues for most schools across the state; and many panelists suggested this required more counselors, behaviorists, or disciplinary deans. Though skills in organizing and managing classroom rules and behavior are reinforced by school wide strategies and programs that are uniformly enforced, panelists felt the need for behavioral expertise. As noted, Element 28, special education, includes behaviorist positions; this position is intended largely to aid schools and teachers develop and implement a positive assertive discipline strategy in the school and in each teacher's classroom.

Some panelists argued that every prototypical school needed a full-time nurse position. This concern was somewhat alleviated when the study team pointed out that the allocation of one school nurse for every 750 students would be sufficient for districts to provide for a full-time nurse in the prototypical 600-student high school and a half time nurse position in each of the 450-student elementary and middle schools.

Finally, some panelists stated that large numbers of students currently suffer from mental health issues that require therapy and suggested that therapists, such as psychologists and/or psychiatrists, be added to the model. One big issue here is whether such services should be included in the education budget or in the broader state and local health and human/social services budget. Mental health therapists are not included in the EB model at this point, but note that Michigan as a state may need to enhance the level of mental health services it provides its citizens, including its children. One way to access such services, noted by several panelists, is to partner with local County Health Systems. Indeed, in a few districts, the county health systems provided clinics in schools.

#### *Element 9: Supervisory Aides/School Resource Officers*

The goal of the EB model's providing supervisory aides is to create a system in which non-instructional duties such as hall, lunch, recess, or bus duty are provided by supervisory aides and not teachers. The EBPJ panels broadly supported the recommendation for supervisory aides in all schools to remove these "duties" from teacher responsibilities, hire non-licensed and lower-priced staff for these functions, and have teachers use the extra time for some combination of collaborative teacher work and individual planning and preparation. The general EB allocation is two supervisory aide positions for each prototypical elementary and middle school and three for a prototypical high school.

Although the panels did not raise the issue of school resource officers (SROs), the study team takes this opportunity to make relevant comments on them. SROs are individuals who provide additional safety for schools, which can include multiple activities, including securing doors and hall duty. The EB model's perspective on SROs is that they often are (in other states), and should be, funded by the police/sheriff/public safety budgets of towns or local municipalities, not school districts. The study team assumes that is the case for some Michigan schools as well. Public safety offices generally estimate resource needs based on the total population of their jurisdiction, which includes students. Thus, public safety officers should be available to provide protection to schools during school hours when that portion of the population is in school. In addition, public safety agencies also maintain the high cost insurance required for safety and police officers, costs that would substantially increase the cost to school districts if they employed SROs.

*Element 10: Library Media Specialists*

The panelists supported the recommendation of one library media specialist for each prototypical school. Panelists noted that librarians today play much broader roles than in the past, including helping the school provide access to and enabling students to access a wide variety of information sources on line.

Panelists agreed with the EB approach to move what used to be library media specialists – people who monitored movie projectors, slide projectors, etc. and who became school technology experts – to the central office and name them school computer technicians.

*Element 12: School Site Secretarial Staff*

The allocation of two secretarial positions at prototypical elementary and middle schools and three secretarial positions at prototypical high schools was generally supported. Some panelists indicated this was more staff than they had at schools in their districts, others said it was somewhat less. The study team left these allocations as originally recommended.

*Element 13: Gifted and Talented*

The panels supported the recommendation of \$40 per student, which provides access to the internet-based GoQuest system, formerly called Renzulli Learning. Generally, the panelists endorsed the concept of this type of approach for enriched experiences for areas of interest or talent for all students.

*Element 14: Professional Development*

The PJ panels supported the professional development recommendations in the EB Model. These include sufficient time during the regular school day for collaborative teacher work, instructional coaches (Element 5), additional days in the teacher work year to ensure a total of 10 days for training and \$125 per student for trainers and other professional development costs (such as coffee and donuts at professional development sessions, but not for tuition credit costs).

Panelists generally agreed that today the typical Michigan teacher contract includes five pupil free days for professional development. That would mean the EB model would increase the typical teacher work year by 5 days, which is done by calculating the current average daily rate for a teacher, and adding five times that to the current average teacher salary to cost out the EB model.

During this discussion, the issues of the teacher work year, days of instruction, days supposed to be used for professional development, and days for opening and closing schools and having parents emerged. Often so-called PD days are used for something other than professional development. When asked, the EB model's suggestion to most states is to create a standard 200-day teacher work year: 180 days of instruction, 10 pupil free days devoted exclusively to professional development, two to three days at the beginning and end of each year for opening and closing school, and another two to four days for parent-teacher conferences in the fall and spring. We encourage Michigan to set a standard for the number of instructional days in the school year, and argue that 180 days is appropriate. At present, however, the EB model does not explicitly include a recommendation that the instructional year should be a set number of days, and accepts the instructional year a state determines. The Michigan EB model will increase the average teacher's salary by five days so that the model provides ten pupil free days for the training element of professional development.

Finally, we note that the robust professional development resources provided by the EB model are meant to cover *all* teacher professional development needs, including for example, content-based instructional strategies now linked to common core standards, the SIOP strategies needed for sheltered English instruction, instructional skills to identify and instruct the gifted and talented, training for instructional coaches, and appropriate training for elective teachers.

*Element 19: Activity Funds and Extra Duty Pay*

The panelists supported the inclusion of resources for sports, clubs, and other extracurricular activities. Many argued that the funding levels were too low for high schools. Several panelists in more than one panel stated that their secondary extracurricular programs cost closer to \$600 per student, excluding transportation. These panelists suggested that the activities amount be differentiated by school level, with different amounts for elementary, middle, and high schools.

Other panelists noted that these resources would be provided to school districts which themselves could make appropriate allocations among elementary, middle and high schools and suggested the amount be left as is, a point with which the study team agreed.

*Element 20: Maintenance and Operations*

This topic was not discussed in detail, as most of panelists lacked knowledge in this area.

*Elements 23, 24, 25 and 26: Strategies for Struggling Students*

Panelists were generally supportive of the recommendations of resources for these services. The EB model now provides all these resources for students who are eligible for free and reduced-price lunch as well as for all ELL students. ELL students trigger these extra help resources whether or not they are eligible for free and reduced-price lunch. The goal is to make resources for students from poverty and for ELL students more robust, and in addition to special education.

All panels stated that transportation would need to be addressed and probably expanded for both extended day and summer school programs. Transportation was not included in this study.

*Element 26: English Language Learner Students*

For ELL students, the EB model provides extra tutoring (one position for every 125 ELL students), extended day (one position for every 120 ELL students), summer school (one position for every 120 ELL students), additional pupil support (one position for every 125 ELL students) and additional resources for language services (one position for every 100 ELL students). Altogether, this provides 4.2 positions for every 100 ELL students; put differently, each group of about 23 ELL students triggers an additional licensed position. By any measure, this allocation is adequate and panelists generally agreed with this perspective.

*Element 27: Alternative Schools*

The EB model provides funding for the equivalent of one assistant principal and one full time teacher or educational professional for every seven students in an alternative school. This allocation provides a source of funding that can then be used to staff schools a variety of different ways, depending on the

specific needs of the students in those alternative schools. Generally, PJ panelists felt that for typical alternative schools, with a small number of students – usually 50 or fewer – this formula would work well, particularly if alternative school students were defined as children with multiple behavioral and emotional issues, including substance abuse.

This allocation supported the staffing of the Saginaw Security School, as well as another district's Juvenile Detention Center, both of which enroll students in line with the EB approach, i.e., students with multiple, emotional behavioral and often substance abuse issues.

Panelists also supported using the alternative school formula for resourcing the Welcome Centers for ELL students new to the district and the country and from various “traumatic” places such as refugee camps, wars, etc.

#### *Element 29: Compensation*

Panelists generally understood that the model will use the prior year average salaries to “price” out all staff, and there was support for including realistic assumptions about the cost of various benefits, particularly health insurance, in the model.

For pension costs, Michigan pays “off the top” an amount for “unfunded” pension costs of 11.04 percent for education staff and requires districts to pay 25.56 percent for ongoing pension costs. The model used this approach and 25.56 percent is the estimated cost of local pensions. In the future, Michigan could decide it wanted districts also to pay the 11.04 percent amount as well; this would require a change in current policy and increase compensation costs for all staff.

Worker compensation averages 0.6 percent for all staff. It is our understanding that the state reimburses 100 percent of unemployment insurance so that entails no cost for school districts. The EB model uses 0.6 percent for workers compensation and zero percent for unemployment insurance.

Districts on average pay about \$12,000 for each employee for health insurance. The EB cost estimates use this estimated figure for health insurance costs.

Some districts also provide disability and small life insurance policies. The EB model does not include life insurance as a benefit and the costs of short-term disability are extremely low, so the model does not include a line for these items.

## **Summary**

This section summarized the reflections and discussion of four Evidence-Based Professional Judgment panel meetings that occurred in October 2017 across the state of Michigan. Approximately 100 educators attended these meetings in four locations across the state. The panels consisted of educators, approximately half of whom were teachers and the rest school site administrators, special educators, and/or central district administrators and board members.



Overall, the panels offered several important and helpful suggestions. In three areas – central office, preschool activities, and curriculum resources for extra help programs– panel recommendations led us to recommend Michigan changes to the EB model. Although the study team did not modify the EB model in response to suggestions in four other areas, the capacity to do so through the simulation model will enable policy makers to understand the costs of these suggested changes as well, should the state choose to adopt them.

For most of the model elements, particularly the instructional-focused elements, there was general agreement among PJ panelists that the EB Model provides adequate resources for all Michigan school children to be given an equal opportunity to meet the state’s proficiency standards.

**Final EB Michigan Recommendations**

Table 8 provides a detailed summary of the resultant EB Michigan model resources.

**Table 8  
Summary of 2017 Michigan Adjusted Evidence-Based Model Recommendations**

<b>Model Element</b>	<b>2017 Evidence-Based Recommendation</b>
<b>Staffing for Core Programs</b>	
1a. Preschool	Full day preschool for children aged 3 and 4. One teacher and one aide in classes of 15
1b. Full-Day Kindergarten	Full-day kindergarten program. Each K student counts as 1.0 pupil in the funding system
2. Elementary Core Teachers/ Class Size	Grades K-3: 15 (Average class size of 17.3) Grades 4-5/6: 25
3. Secondary Core Teachers/ Class Size	Grades 6-12: 25 Average class size of 25
4. Elective/ Specialist Teachers	Elementary Schools: 20% of core elementary teachers Middle Schools: 20% of core middle school teachers High Schools: 33 1/3% of core high school teachers
5. Instructional Facilitators/ Coaches	1.0 Instructional coach position for every 200 students
6. Core Tutors/ Tier 2 Intervention	One tutor position in each prototypical school (Additional tutors are enabled through poverty and ELL pupil counts in Elements 22 and 26)
7. Substitute Teachers	5% of core and elective teachers, instructional coaches, tutors (and teacher positions in additional tutoring, extended day, summer school, ELL, and special education)
8. Core Pupil Support Staff, Core Guidance Counselors, and Nurses	1 guidance counselor for every 450 grade K-5 students 1 guidance counselor for every 250 grade 6-12 students 1 nurse for every 750 K-12 students, which supports a half time nurse in each prototypical elementary and middle school and a full-time nurse in each prototypical high school (Additional student support resources are provided on the basis of poverty and ELL students in Element 23)
9. Supervisory and Instructional Aides	2 for each prototypical 450-student elementary and middle school 3 for each prototypical 600-student high school
10. Library Media Specialist	1.0 library media specialist position for each prototypical school
11. Principals and Assistant Principals	1.0 principal for the 450-student prototypical elementary school 1.0 principal for the 450-student prototypical middle school 1.0 principal and 1.0 assistant principal for the 600-student prototypical high school

<b>Model Element</b>	<b>2017 Evidence-Based Recommendation</b>
12. School Site Secretarial and Clerical Staff	2.0 secretary positions for the 450-student prototypical elementary school 2.0 secretary positions for the 450-student prototypical middle school 3.0 secretary positions for the 600-student prototypical high school
<b>Dollar Per Student Resources</b>	
13. Gifted and Talented Students	\$40 per student
14. Intensive Professional Development	10 days of student-free time for training built into teacher contract year, by adding five days to the average teacher salary \$125 per student for trainers (In addition, PD resources include instructional coaches [Element 5] and time for collaborative work [Element 4])
15. Instructional Materials	\$190 per student for instructional and library materials \$50 per student for each extra help program of poverty, ELL, summer and extended day
16. Short Cycle/ Interim Assessments	\$25 per student for short cycle, interim and formative assessments
17. Technology and Equipment	\$250 per student for school computer and technology equipment
18. CTE Equipment/ Materials	\$10,000 per CTE teacher for specialized equipment
19. Extra Duty Funds/Student Activities	\$300 per student for co-curricular activities including sports and clubs for grades K-12 \$50 per preschool student
<b>Central Office Functions</b>	
20. Operations and Maintenance	Separate computations for custodians, maintenance workers and groundskeepers and \$305 per student for utilities
21. Central Office Personnel/ Non-Personnel Resources	A dollar per student figure for the Central office based on the number of FTE positions generated, as depicted in Table 3.7, and the salary and benefit levels for those positions. It also includes \$300 per student for miscellaneous items such as Board support, insurance, legal services, etc.
<b>Resources for Struggling Students</b>	
22. Tutors	1.0 tutor position for every 100 ELL students and one tutor position for every 100 non-ELL poverty students
23. Additional Pupil Support Staff	1.0 pupil support position for every 125 ELL students and one tutor position for every 125 non-ELL poverty students
24. Extended Day	1.0 teacher position for every 120 ELL and for every 120 non-ELL poverty students
25. Summer School	1.0 teacher position for every 120 ELL and for every 120 non-ELL poverty students
26. ESL staff for English Language Learner (ELL) Students	As described above: 1.0 tutor position for every 100 ELL students 1.0 pupil support position for every 125 ELL students 1.0 extended day position for every 120 ELL students 1.0 summer teacher position for every 120 ELL students; In addition, 1.0 ESL teacher position for every 100 ELL students.
27. Alternative Schools	One assistant principal position and one teacher position for every 7 ALE students in an ALE program One teacher position for every 7 Welcome Center eligible ELL students
28. Special Education	8.1 teacher positions per 1,000 students, which includes: 7.1 teacher positions per 1,000 students for services for students with mild and moderate disabilities and the related services of speech/hearing pathologies and/or OT PT. This allocation equals approximately 1 position for every 141 students. <b>Plus</b> 1.0 psychologist per 1,000 students to oversee IEP development and ongoing review.

Model Element	2017 Evidence-Based Recommendation
	<b>In addition,</b> Full state funding for students with severe disabilities, and state-placed students, minus the cost of the basic education program and Federal Title VIB, with a cap on the number covered at 2% of all students.
<b>Staff Compensation Resources</b>	
29. Staff Compensation	For salaries, average of previous year For benefits: Retirement or pension costs: 25.56% per employee Health Insurance: \$12,000 per employee Social Security 6.2% (up to annual earnings of \$127,200) Medicare: 1.45% Workers' Compensation: 0.6 % Unemployment Insurance: 0% as the state cost fully reimburses costs

*Calculating the Base Per Student Cost and Pupil Weights*

To estimate adequacy costs based on the model described in Table 3.8, the EB study team developed an Excel-based simulation that provides the Evidence Based base cost per student as well as computes weights for special education, students in poverty and English Language Learners. Critical to these estimates are the costs of personnel. Salary data used to develop the cost estimates can be found in Appendix D.

To estimate total compensation, the model used the benefit rates described earlier. With these compensation estimates, the per student EB base expenditure is estimated to be \$10,136, with weights of 0.32 for poverty or at-risk students and 0.41 for ELL students.<sup>19</sup> The per student EB preschool cost estimate is \$14,155 which computes to a weight of 0.40 relative to the base per student expenditure estimate of \$10,136. The alternative school cost estimate is \$16,618 per student, which computes to a weight of 0.64 relative to the base per student figure of \$10,136. These weights are depicted in Table 9, below.

**Table 9  
EB Total Base Cost and Additional Weights**

<b>Base</b>	<b>\$9,582</b>
<b>Weights</b>	
Prekindergarten	0.40
Poverty	0.32
ELL	0.41
Special Education (For mild and moderate special education students; Census approach applied to all students in a district, not only the special education count)	0.07 (see explanation below)
Alternative Schools	0.64

<sup>19</sup> The ELL recommendations also include welcome centers for districts impacted by substantial numbers of new students with no English language skills. These are funded at the same level as alternative schools, and would have the effect of providing some districts with a higher weight for ELL during the time the welcome center was open.

The special education cost estimate and derived weight require further explanation. It is important to first note that the EB model assumes the state funds 100 percent of the excess costs of programs for students with severe and profound disabilities.

To estimate costs for students with mild and moderate disabilities, the EB model uses a “census” approach and computes an additional amount based on the count of all students in a district, not on the special education student count in each district. The EB estimate for the cost of special education is \$673 per student for *all* students.

This equates to a weight of 0.07 applied to the total number of students in a district (or state). The effect is that the total revenue generated through the EB model for special education for children with mild and moderate disabilities is equal to the base EB cost estimate (in this model \$10,136=) times 0.07 for all students in the district (or state). Or looked at another way, every student (except those with severe and profound disabilities) in a district (or state) generates 1.07 times the EB base cost estimate (\$10,846).

Finally, it is important to remind readers that the Excel-based simulation model can be used to model alternative resource levels. When used to do so, a revised base per student cost estimate will result, along with new estimates and weights for students in poverty, English language learners, and for special education. Costs for pre-school and alternative school students will also change as the parameters of the model are adjusted by the simulation user.

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