Financing Personalized Learning: What Can We Learn From First-Generation Adopters?

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CRPE
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ABOUT THIS REPORT

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ABOUT THE CENTER ON REINVENTING PUBLIC EDUCATION

Through research and policy analysis, CRPE seeks ways to make public education more effective, especially for America's disadvantaged students. We help redesign governance, oversight, and dynamic education delivery systems to make it possible for great educators to do their best work with students and to create a wide range of high-quality public school options for families. Our work emphasizes evidence over posture and confronts hard truths. We search outside the traditional boundaries of public education to find pragmatic, equitable, and promising approaches to address the complex challenges facing public education. Our goal is to create new possibilities for the parents, educators, and public officials who strive to improve America's schools. CRPE is a nonpartisan, self-sustaining organization affiliated with the University of Washington Bothell. Our work is funded through private philanthropic dollars, federal grants, and contracts.

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Afton Partners' mission is to support America's public education organizations by advising on and implementing financial strategies that sustain effective educational systems and programs. We provide financial consulting and related operational advisory services to public school districts, charter management organizations, foundations and private investors who support education reform.

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Foreword

For decades, teachers in public and private school settings have struggled with the same challenges: How to make sure students who are falling behind can catch up quickly? How to make sure those students who are mastering material quickly are not held back? How to make sure students don't fall through the cracks and disengage?

Education leaders, policymakers, and philanthropies increasingly believe that the answer is personalized learning—tailoring learning to individual students' strengths, needs, and personal interests, and often integrating technology, in order to boost student outcomes. But shifting traditional classrooms to this model requires a sea change in our schools.

Hundreds of schools across the country are designing new schools or transforming existing ones. Though the specifics vary by school, most personalized learning schools aim to adjust instruction and staffing models to maximize learning opportunities for each student. The basic idea is that rather than "teaching to the middle," teachers will be able to truly differentiate instruction using a variety of strategies to meet individual student needs. At least in theory, this approach can help each student master as much content as fast as he or she is able, while also making sure that no student falls behind.

However, reorganizing time, talent, technology, and physical space to support these new learning approaches takes investments of money and time. There are dozens of philanthropies, new support organizations, and policy groups dedicated to helping schools implement this model, and philanthropy has supported most of the start-up costs for many of these schools. More than 100 schools in at least 15 states are implementing personalized learning models with support from the Bill & Melinda Gates Foundation.

If personalized learning models prove promising enough for more widespread adoption, we will need to know how such schools can be developed and sustained at scale. It is also important to address whether personalized learning, as many fear and others hope, means that schools will begin to substitute technology for labor.

At the Center on Reinventing Public Education, we have taken the first systematic look at costs associated with implementing personalized learning schools, how leaders of these schools choose to allocate their funds, and what it might take to make personalized learning financially sustainable on public dollars. We studied 16 charter elementary and secondary schools with a wide range of personalized learning models from across the country (we were unable to get comparable data on district schools). All of these schools have received significant financial support through the Gates Foundation's Next Generation Learning Challenges (NGLC), perhaps the earliest and most significant philanthropic investment in personalized learning to date. (The Gates Foundation also funded our study.)

This was a study of a particular set of schools. Almost all were brand new so would encounter some start-up costs, regardless. All were supported with significant grants. All were charter schools, so have different spending and revenue patterns than district schools. That said, this first look at the finances of personalized learning is valuable in uncovering costs and spending patterns that are likely unique to the personalized learning context, enabling educators and policymakers interested in the model to learn from these early frontrunners and, ideally, more clearly understand the potential fiscal implications.

What we know from these schools is that there is no single start-up "cost" to personalized learning. The schools in our sample spent what they had, sometimes a lot, sometimes very little. In some

ways, it should be heartening for those considering implementing this model to see that some schools have spent as little as $7,400 per student to start their schools, little more than typical start-up costs. (In a fully virtual school, start-up costs ere even lower: $5,300 per pupil.)

A caution to those considering adopting personalized learning models: schools routinely underestimated costs in their start-up planning in two areas: hefty consulting fees for teacher training, and costly facility remodeling and purchasing. These big-ticket items point out the need for better up-front planning and strategy around training teachers to successfully implement personalized learning, as well as thinking through the costs of creating the kinds of spaces that are better suited to personalized learning, where students are often required to move in ways outside the traditional classroom design.

This study should reassure those who worry that teachers will be replaced by technology under personalized models. When schools were faced with budget trade-offs, they typically cut technology costs in order to preserve small class sizes and staff positions. However, the fact that schools viewed technology as a "luxury good," not an essential instructional tool, may also be cause for concern if these decisions were driven more by habit and teacher preference rather than what is best for students and the most productive use of resources.

Whether personalized learning schools can afford expensive staffing models and expensive technology after private funding runs out is an open question. We found that while schools are reducing their overall reliance on private philanthropic dollars as enrollment grows, it's unclear if some schools will ever be able to run their personalized learning models purely on taxpayer dollars. About a third of the schools we studied showed significant, and sometimes even increasing, reliance on private funds for ongoing or recurring costs (as opposed to one-time costs during the start-up or implementation phase). These trends are reminiscent of the early days of charter management organizations, many of which overestimated how quickly enrollment growth would enable them to become financially self-sustaining while underestimating the start-up and ongoing costs and time needed to develop the systems vital to ensuring quality. Philanthropies would be wise to require districts and schools asking for start-up funds in support of personalized learning to demonstrate that their business plans incorporate realistic projections and risk management plans.

These are still the early days of personalized learning. Now is the time for experimentation and adaptation based on lessons learned from the pioneers of this educational movement. This study provides what we hope is just the beginning of a strong evidence base for understanding realistic budget and policy planning for start-up and ongoing expenses, productivity, fiscal trade-offs, and short- and long-term financial sustainability. The magnitude of dollars, and more importantly, educator and student time, being invested in these schools is already significant and likely to grow exponentially. We need to think hard about how to use scarce public and private dollars to their greatest effect so that personalized learning can achieve its promise.

Robin Lake, Director
Center on Reinventing Public Education

Introduction

Most classrooms today look a lot like the classrooms of a hundred years ago. Students in traditional classrooms are usually offered a one-size-fits-all education: one teacher, around 25 to 30 students, and some sort of screen, board, or other display at the front of the room to convey information. In more "progressive" classrooms, kids may engage in projects or group activities, but even then there are limited opportunities for students to move through material at their own pace. Students who haven't mastered content are too often left behind because the teacher needs to move on, and students who have already mastered content are forced to wait, limiting their potential growth. Content offered by the teacher may be dry and uninteresting to one student and fascinating to another.

As American school leaders seek ways to dramatically improve academic outcomes for an increasingly diverse student body and prepare them to thrive in an increasingly global economy, many philanthropies and school districts are placing big bets on new school and classroom models that are designed to offer a more personal and individualized learning experience and solve chronic operational challenges.[1] Among the first of these initiatives was the Next Generation Learning Challenges (NGLC), supported by the Bill & Melinda Gates Foundation. NLGC has awarded planning and launch grants to four waves of grantees (44 total schools and support organizations) that are focused on innovating and adopting new, personalized instructional approaches. These new approaches to education strive to solve a variety of instructional challenges, from managing large classes to differentiating instruction to meet the needs of students who learn at different paces, to managing the cost of expanding educational demands with limited public dollars.

Broadly classified as "personalized learning" (PL) models, NGLC schools' approaches vary substantially. But leaders are united by their goal to provide students with highly differentiated academic and social learning experiences. Personalized learning does not necessarily utilize technology, but many PL schools leverage technology and other strategies so that pedagogy, curriculum, and learning environments can be tailored to individual student needs.

COMMON ELEMENTS OF PERSONALIZED LEARNING INCLUDE:

1. **Learner Profiles** that detail students' strengths, areas for growth, and goals.
2. **Personal Learner Paths** that tailor content, instruction, and assessment to students' individual needs, interests, and skills.
3. **Competency-Based Progression,** in which students only progress to more advanced content when they have proven mastery of prerequisite concepts.
4. **Flexible Learning Environments,** in which all school structures and systems adapt to best meet students' learning needs.

Personalized learning is intuitively attractive to many educators, parents, and students. And many schools are looking to adopt some form of a technology-supported PL model. However, understanding the start-up and ongoing costs of personalized learning models—as well as the resource tradeoffs schools must consider—is key to PL's success and expansion. Insight into how some PL schools allocate their resources differently from one another is central to helping the field understand the key components and sustainability of today's school models that incorporate technology and other tools in an attempt to dramatically accelerate student learning.

For the past three years, the Center on Reinventing Public Education (CRPE) has been conducting the first comprehensive study of how much personalized learning schools spend and how PL school leaders choose to allocate their funds. Using data from 25 NGLC grantee schools, we set out to learn:

- How much money have NGLC schools using personalized learning received from public and private sources, and how have they spent their money?
- How did actual spending in NGLC schools using PL compare to their anticipated spending? When spending varied substantially from budget projections, what accounted for these differences?
- To what extent have NGLC schools using PL reduced their dependence on private money over time?

NEXT GENERATION LEARNING CHALLENGES SCHOOL MODELS

School models supported by NGLC vary substantially in how they use technology and their overall educational approach, but two primary approaches to personalizing learning emerged from the NGLC sample during our study. The first model (most often seen in elementary schools) maintained the traditional classroom by grade structure, but within the classroom the teacher ran several stations through which students rotated. One station typically involved students working on a computer or tablet. For example, one school used three stations—one small group station where the teacher provided students instruction and support, one or more independent practice stations where students completed online or offline work based on their individual needs, and one peer station where students collaborated to solve high-level problems.

A second model (primarily at the middle and high school level) used a combination of internships, project-based learning, and individualized online learning paths to make education accessible and meaningful to every student.[2] Notably, many schools in our sample changed (and continue to change) their approach to PL as their leaders have learned what works for their students and teachers.

Working in partnership with CRPE, Afton Partners collected school-level revenue and expense data from 25 NGLC schools that launched their programs in the 2012-13 and 2013-14 school years. Sixteen of the 25 NGLC schools were charters, and nine were traditional district-run schools. This report exclusively reflects data from the 16 charter schools, all but one of which opened as new schools.[3] CRPE also conducted two rounds of extensive interviews with 20 school leaders in 11 states, providing rich descriptions and context that help to explain patterns we observed in the financial data.[4] We also conducted site visits to four schools—two on the west coast, one in the Midwest, and one on the east coast—to observe first-hand the various ways these schools reorganized their use of time, talent, technology, and space.

Summary of Findings

Per-pupil revenue and expenses varied considerably across schools in our sample. Although the three highest spending schools spent over $20,000 per student in their first year of operation, several schools in our sample embarked on this work with revenues near or even below the 2013 national average of $12,000 per student, even including private funding.[5] Despite these vast differences in available resources and subsequent spending, several themes emerged from the data that may inform the experiences of future PL school leaders.

1. **The total amount personalized learning schools spent on their programs was largely spent on salaries, facilities, and operations—not technology.** The spending categories in the PL schools we studied are fairly typical of any school in its first or second year of operation or implementing a new program; most funds are spent on staff and facilities during both planning and operational years. The unique designs of these schools, however, likely had some impact on spending. Visions for a highly personalized teaching and learning approach can limit suitable facilities options or increase renovation costs. In response to intensive staff development and technical support needs, school leaders often elected to spend on high-cost consulting services and technology infrastructure development.

2. **One-time costs associated with starting a PL school can be substantial, but not always.** Starting any school comes with a set of expenses that it must incur in the early days but will never (or rarely) have to pay for again. The schools in our sample met a variety of circumstances and start-up needs, but salary costs in a planning year, spending on facilities, developing a tech infrastructure, and consultant support in schools' first years of operation were often among the most significant of these non-recurring expenses (NRE). Average NRE increased during the three-year period for which we have data, hitting a high of nearly $250,000 in the five schools for which we have two years of operational data.[6] However, the schools anticipate that these costs will stabilize and drop as schools become more established.

3. **Start-up expenses, revenue forecasts, and enrollment projections are easy to get wrong.** While non-recurring start-up costs are always difficult to anticipate, they are even more so in innovative PL contexts given the newness of the designs. Schools almost universally underestimated start-up expenses and often overestimated revenues, particularly revenue driven by total enrollment. Schools in the sample faced particular challenges recruiting the number of students they hoped to enroll and accurately predicting facilities needs.

4. **When faced with financial trade-offs, schools tend to protect human capital and reduce technology spending.** Twelve of the 16 schools included in this study missed their enrollment projections for their first year of operation.[7] This resulted in lower than expected revenues and tough financial tradeoffs. In the wake of these enrollment and budget shortfalls, schools spent only marginally less than they planned on human capital, often resulting in smaller class sizes than the schools had originally anticipated. Schools enabled low student-to-instructional staff ratios, as well as some unanticipated facilities costs, by spending substantially less than they planned on technology—on average, schools spent 44 percent less on software than they anticipated. In general, the schools we studied treated technology as a luxury good—they paid for it when they had extra money to spend and reduced it when they were short on resources.

5. **Schools appear to be reducing their reliance on private supports, but their long-term financial sustainability is still unclear.** Buoyed by philanthropic support, 13 of the 16 schools in our sample ran budget surpluses in their first year of operation. However, 9 of the 16 schools used private dollars to pay for recurring expenses that will continue after private funding dries up. Still in their early days of operation, it is impossible to know at this time whether these schools will be able to sustain their current personalized learning models on public dollars alone, but all of the schools have so far managed to steadily shrink their overall reliance on private funding.

Some of these insights into NGLC schools' experiences, gleaned principally from descriptive financial analysis, are common to all charter schools. These schools, however, presented two distinct challenges that are worth highlighting. First, it seems difficult to estimate technology expenses and enrollment in PL schools. With rapid innovation in the technology sector, this issue is understandable. Failure to meet enrollment expectations, while common among start-up schools, was concerning in that these missed projections seemed to set off a sequence of resource decisions that ultimately altered many of the schools' models.

Second, school leaders are much more reluctant to invest in information technology than we expected. Justifications varied from taking a wait-and-see approach for market leaders to emerge, to a reliance on the tried-and-true approach to instruction until the charter contract is renewed.

As PL schools expand, leaders will be well-served addressing these two issues early and often in their planning year and beyond.

Data, Methods, and Limitations

We obtained self-reported financial information from two cohorts of NGLC schools: those that opened in 2012 and those that opened in 2013. We refer to these schools as the "2012 cohort" and the "2013 cohort." Nine district and charter schools were awarded NGLC grants in the 2012 cohort and 16 schools were awarded grants in the 2013 cohort. We excluded 3 of those 25 schools from all of our analyses due to incomplete data.[8]

We later eliminated all district schools from this analysis because we found that they inconsistently reported district-level costs such as utilities, custodial/cleaning, and food services. Unlike the charter schools, which reported the dollars allocated to their central charter management organization (CMO), most district schools did not report centrally provided resources. This reporting difference made it difficult to draw comparisons between the allocation decisions of district and charter schools.

Removing district schools from the sample left us with a sample of 16 charter schools—seven in the 2012 cohort and nine in the 2013 cohort. All but one of the schools included here were new start-ups (one 2013 cohort school was a redesign). The sample includes elementary, middle, and high schools, located in eight states and the District of Columbia. (See Appendix A for an overview of the schools and data included in this analysis, and Table 1 for a summary of the schools' demographic information.)

Table 1. Demographics of the 2012 and 2013 NGLC Charter School Grantees[9]

Students Served	Average	Maximum
% African-American	35	100
% American-Indian	1	16.1
% Asian/ Pacific-Islander	6.3	33
% Caucasian	11	36
% Hispanic	34	90
% Special Education	11.9	26
% English Language Learners	14.7	58
% Free/Reduced-Price Lunch	67.1	100
Enrollment	201	329 (min=62)
Student-to-instructional staff ratio	13.3	24.9 (min=3.7)

The data for all schools in the sample include original and revised spending projections for their first five years of implementation, as well as actual spending in the planning year (year 0) and first year of implementation (year 1). For five of the 2012 cohort schools, data were available on actual spending in the second year of implementation, allowing us to examine how spending evolves in the early years of implementation for these schools (see Table 2 for a description of the financial data sources and number of schools for which these data were available).

Table 2. Data Sources by Number of Schools and by Cohort

	Projected Budget	Planning Year Expenses	Year One Expenses	Year Two Expenses
Total number of NGLC schools in sample	16 schools 2012 Cohort: 7 2013 Cohort: 9	16 schools 2012 Cohort: 7 2013 Cohort: 9	16 schools 2012 Cohort: 7 2013 Cohort: 9	5 schools 2012 Cohort: 5 2013 Cohort: 0

To give context to the financial data, we interviewed 13 charter school leaders (the 2012 cohort leaders were interviewed twice).[10] Interviews provided us with rich descriptions of the school's programs and how these programs have evolved over time.

Schools reported their financial data by populating a customized spreadsheet, which allowed for the comparison of revenue and expenses by common categories across schools. By asking schools to provide data in a common template, we were able to learn where schools draw their revenue and apply their expenses, how revenue and expenses vary across schools—and, for a handful of early implementers, how their revenue and spending changed over time. Although the template that school leaders used to report their financial data provided detailed explanations of revenue and expense categories, these self-reported data are unaudited and category interpretations may have differed slightly among school leaders.[11]

This study contributes an important first glance at PL schools' resource allocation decisions, but it notably examines a set of PL schools that are unique in both their selection and funding streams. Schools receiving NGLC funds were selected from a competitive applicant pool and therefore likely differ from the average PL school in meaningful ways. Schools in this sample also enjoyed private funding above and beyond their regular funding streams, which likely influenced their budgeting and spending decisions. Therefore, while this study contributes valuable information about resource allocation in a number of leading PL schools and may have implications for schools transitioning to PL in the future, findings are not generalizable to the universe of schools currently implementing or planning to implement PL. Despite this relatively unique circumstance, these schools offer some of the earliest views into the financial decisions of school leaders seeking to personalize learning.

Findings

1. The total amount personalized learning schools spent on their programs was largely spent on salaries, facilities, and operations—not technology.

The spending patterns we observed reflect the school finance adage that "schools spend what they've got," for example, school revenue generally drives school expenses.[12] Across our sample we saw the same variation in total spending as we did in revenue. (See Appendix B for a more complete description of schools' revenue levels and sources.)

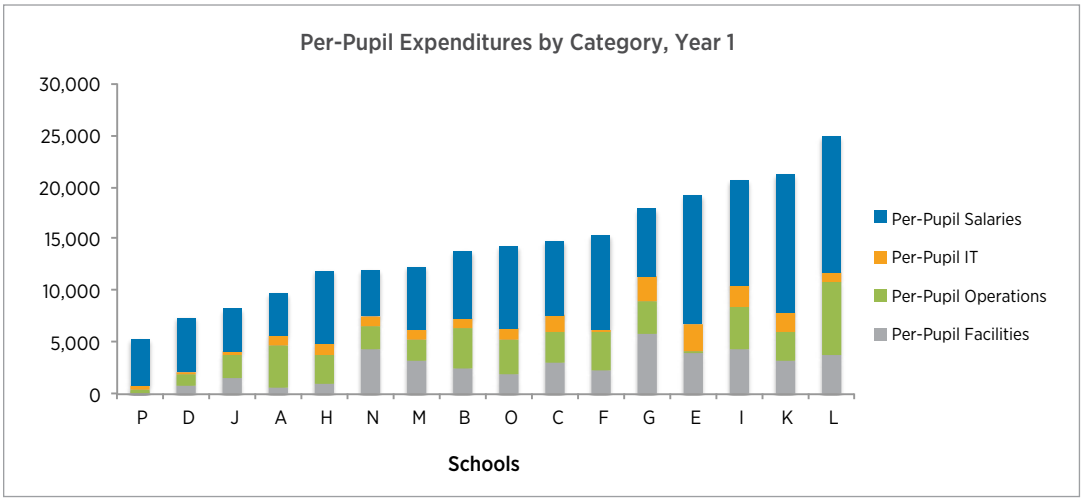
In their first year of implementing PL (year 1) one school—the only entirely virtual school in our study—spent $5,300 per pupil while another school more than tripled that number, spending $24,000 per pupil. Average per-pupil expenses were just under $14,000 in schools' first year of operation and about $10,300 in their second year of operation when enrollment grew (see Figure 1).[13]

Spending on Salaries, IT, and Support

As Figure 1 shows, how schools allocated their money varied considerably, though as with most schools, NGLC schools spent the largest share of their resources on salaries, which accounted for 59 percent of overall spending in year 1. Spending on technology and related infrastructure varied considerably, but in nearly all schools, IT was a minor expense compared to human capital. Salary expenses were more than four times greater than IT expenses in all but one school in our sample. Five of the 16 schools we examined devoted over 10 times as many resources to human capital as IT.

Notably, the schools with a lower human capital-to-IT spending ratio didn't necessarily *substitute* technology for talent. Instead, most of the schools with these lower ratios operated with relatively high total revenue, allowing them to spend substantially on both IT *and* human capital (a trend we discuss in more detail in a later section).[14]

Figure 1. A Large Fraction of Expenditures Is on Salaries, but Spending Patterns Are Inconsistent Between Schools



Schools also spent considerably on support services in various forms. Schools in both cohorts spent an average of nearly $65,000 on consultants in their first year of operation.[15] Having identified specific needs, schools in their second year of operation spent twice as much.[16] Other operations costs accumulated from various sources, including professional development, CMO or district fees, transportation, food services, and a commonly used "other operations" category.

Spending on Facilities

In the first year of operation, facilities costs ranged from 7 percent to 36 percent of a school's total spending, or $112,000 and $584,000 respectively.[17] Eight schools paid for facilities in their planning year, spending anywhere from $2,800 to nearly $250,000. Five of those schools, all of which were located in relatively expensive real estate markets (California, Chicago, and New York), allocated more than 10 percent of their spending to facilities.[18] On the other hand, a start-up charter school in the expensive Washington, D.C., marketplace spent a relatively small percentage of its expenses on facilities.[19]

The amount that schools spent on facilities in each year also depended on whether the school owned or leased their space—decisions that were often influenced by real estate availability. Additionally, school principals' visions for instructional spaces and related renovation impacted total facilities expenses. On average, schools in the sample spent a greater percent of their budget on facilities than schools nationally, but this may be because the vast majority of schools in our sample were in their first year of operation.[20]

Spending on Technology

All but a few schools spent on technology support services (e.g., hardware maintenance and repair). On average, schools spent approximately $205 per pupil per year on these supports. Another notable expense was the cost of devices for students, the cost of which averaged $460 per student.[21] Finally, some school buildings necessitated infrastructure upgrades, which averaged a total of $169 per pupil in schools' first year of operation.[22]

Total Spending

These PL schools, like many new start schools, spent most of their funds on staff and

operations to get the school off the ground.[23] Perhaps reflecting the unique needs of PL schools, which often have visions that involve non-traditional space configurations and technology-supported models of teaching and learning, these schools also spent considerable resources on renovation costs and IT consulting and support services.

NGLC schools all receive some level of private grant funding to cover these extra start-up and ongoing costs. Yet, while most spend at higher rates than their district counterparts, about a third (6 of 16) have revenues within 10 percent of the surrounding district schools.[24]

The following sections provide more detail on which of these costs can be considered one-time, or non-recurring costs, and whether these schools are positioning themselves to move to a self-sustaining financial model.

2. One-time costs associated with starting a PL school can be substantial, but not always.

Getting any new school off the ground requires up-front, non-recurring expenses (NRE). Often new schools include a planning year in which school leaders and sometimes a small core of teachers map out the design for the new school. Start-up schools also spend money to retrofit and purchase new space, for consulting services to implement new instructional or curriculum models and train staff, for IT infrastructure, and for new computer hardware for students and teachers.[25] (See Appendix C for a complete list of expenses we considered to be non-recurring.) When schools are starting up as PL schools seeking to heavily incorporate computer technology or reimagine the use of space in their instructional model, as was the case for all but one of the schools in our sample, launch requires different and possibly higher NRE than in traditional schools.[26] PL schools may require significant technology upgrades in their facilities, intensive professional development for teachers, or a building remodel or retrofit to create new classroom spaces.

All of the new schools in our sample received grants to start their schools and each of the schools structured their grants to include a planning year. They all, to different degrees, expected to invest in NRE related to facilities, IT, and professional learning. We learned that, while schools varied in their total NRE, it was fairly common for schools to incur large NRE for at least the first two years of operation and that these expenses sometimes increased over those first two years.

The schools in our study spent, on average, $347,896 on NRE in years 0 and 1, or an average of $666 per pupil at projected full enrollment.[27] These costs, however, varied substantially from school to school. One school reported spending under $100,000 on NRE in year 0 and 1, while another spent over $600,000, mainly on consulting services and capital expenses.[28]

It is hard to say if these non-recurring expenses were higher or lower than what the schools would have spent without the ambition toward PL. As is the general rule, school leaders make decisions about how much and what to spend based on the resources that are available to them. For example, one CMO that had access to in-kind software developers built an extensive learning management system that responded to myriad organizational and instructional needs, the estimated "cost" of which was $2.1 million. A different CMO that did not have access to such resources developed a more basic platform for about $150,000.

As would be expected, in both cohorts, one-time expenses were substantially higher in schools' first year of operation than their planning year because most schools had to start paying for infrastructure such as facilities, hardware, and wiring. One-time expenses are typically thought of as "start-up costs" but average spending on such costs increased, rather than decreased, over the three years for which we have data (see Table 3), mainly due to added spending on consulting services to help teachers implement the schools' instructional programs.

Table 3. Average Non-Recurring Expenses, by Year and Cohort (per-pupil cost at the projected full enrollment)

	Average NRE in year 0	Average NRE in year 1	Average NRE in year 2
2012 Cohort (per-pupil cost at the projected full enrollment)	$94,626 ($188)	$156,909 ($330)	$246,794 ($547)
2013 Cohort (per-pupil cost at the projected full enrollment)	$202,460 ($376)	$192,869 ($354)	
Average 2012 and 2013 Cohort (per-pupil cost at the projected full enrollment)	$159,327 ($301)	$177,136 ($343)	

Non-Recurring Expenses in the Planning Year

By definition, spending in the planning year are non-recurring expenses. Many school leaders told us that a planning year was essential preparation to implement their new programs. The need for planning is obvious for brand new personalized learning schools that must recruit and prepare staff, recruit students, and prepare all the curriculum, bell schedules, budgets, and so on. Even existing schools that are adopting personalized learning, however, have significant planning needs. This includes, but is not limited to, reworking all of the curricula, retraining teachers, informing families of the new approach, and building new assessment systems.

Both cohorts invested in a planning year averaging just under $160,000, but spanning from under $70,000 to nearly $240,000.[29] The schools, for the most part, relied on private funding to pay for planning year costs, as they did not yet have access to the public funds that come with student enrollment.

Not surprisingly, they spent the majority (51 percent) of planning year expenditures on staff time. Schools also paid for administration and consulting services, including management or district fees (30 percent), securing a facility (15 percent), and establishing necessary technology infrastructure (4 percent).[30]

BUILDING TEACHER CAPACITY FOR PERSONALIZED TEACHING

Seven of the 16 schools in our study reported spending on professional development in their planning year, with an average spending of $37,865, and a range spanning from $295 to $104,144.

More schools spent money on professional development in their first year of operation (year 1) when schools brought teaching staff on board, but the total investment across all schools was lower, with average spending equaling $32,178.[31] All five of the schools for which we have year 2 data maintained significant spending on professional development in year 2—an average of $36,146.

Non-Recurring Expenses in the Operational Years

Schools must continue to invest in one-time expenses as they move into their operational stages. We see schools making investments in facilities and in the development of their new staff.

Schools spent an average of $177,136 on NRE in their first year of operation.[32] Expenses associated with opening and renovating new facilities largely contributed to increases in NRE from the planning year to their first year of operation. However, we also see schools hiring consulting services to support teacher development and purchasing new hardware and software for their instructional programs and data systems.

We only have second year expense information for the 2012 cohort, but it's notable that three of those five schools spent *more* on NRE in that second year of operation than in the first year. These schools mainly added spending on support and infrastructure. For example, four of the five schools increased their spending on consultant support and three of the five schools spent over $50,000 on furniture, fixtures, and equipment.[33] Two of the three schools also purchased student computers in their second year while most others did so in their first year.

These increases in NRE in the second year are a bit concerning—private funds to cover these expenses will dry up eventually. The schools report that these one-time expenses will decrease in subsequent years of implementation. However, as the next section shows, some of these expenses seemed to catch the schools by surprise, and their experience offers lessons for future personalized learning schools.

3. Start-up expenses, revenue forecasts, and enrollment projections are easy to get wrong.

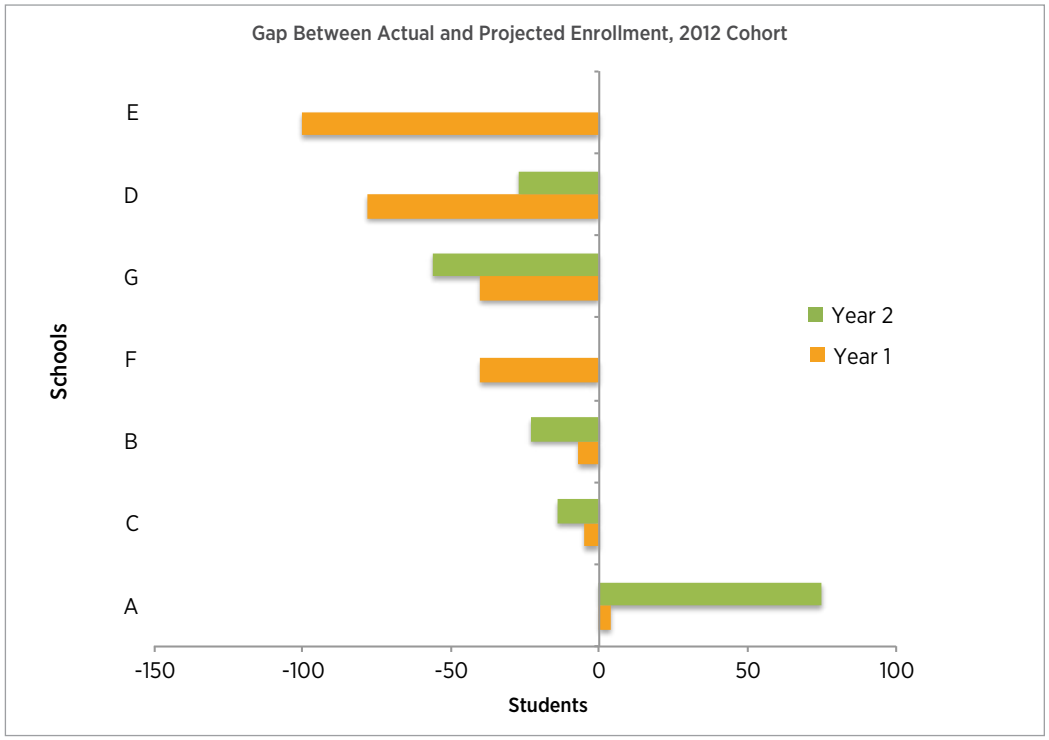
Many of the school leaders in this sample faced two challenges during launch, both of which had significant financial implications for their budgets: recruiting the number of students they had hoped to enroll and accurately predicting facilities needs.

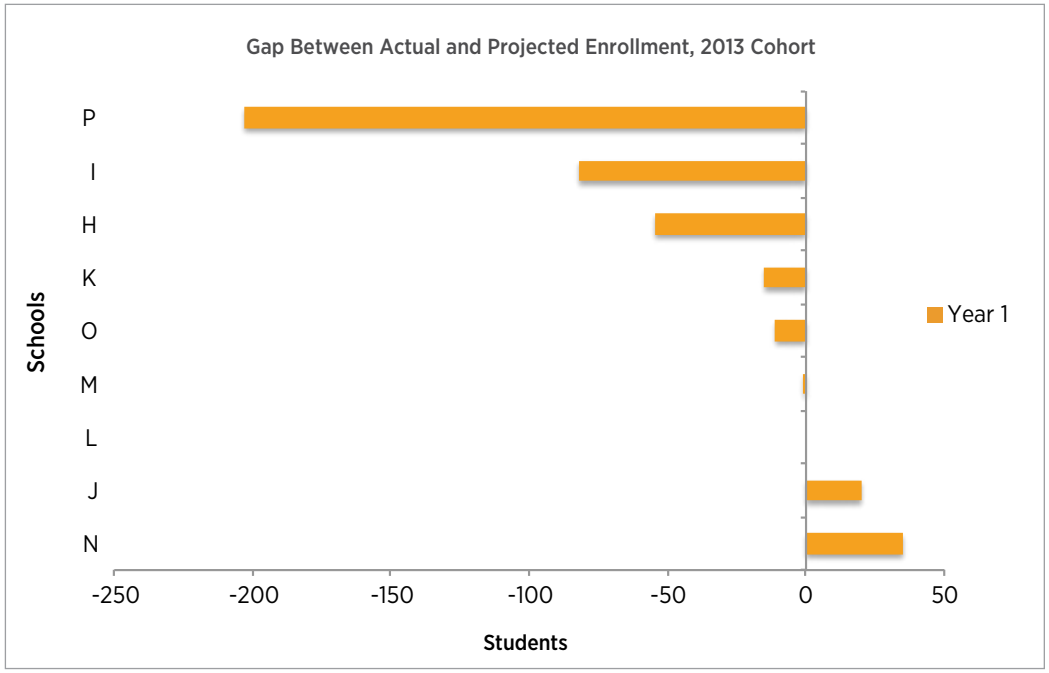
All of the schools we studied mapped out a multi-year budget with the revenue projections based on enrollment projections and anticipated grant funding, yet they still fell short of their year 1 revenue prediction by 17 percent, or an average of over $2,100 per student. A large part of this revenue shortfall was because schools, on average, enrolled fewer students than they projected.

Twelve of the 16 schools in this study missed their enrollment projections for their first year of operation (see Figure 2).[34] The extent to which schools missed the mark ranged considerably in both cohorts from just a few students to over 50 percent of the school's enrollment.

Four of the five schools from the 2012 cohort that we could follow into their second year of implementation continued to miss their original enrollment projections, and the margin of error increased slightly.[35]

Figure 2. Most PL Schools Missed Their Projected Enrollment by a Large Margin





Missing enrollment projections, of course, meant fewer dollars overall in the coffers. In most cases, enrolling fewer students than anticipated also led schools to operate with a lower student-to-teacher ratio than they originally anticipated. In these cases, schools maintained their original staffing plan despite lower enrollments, driving up their per-pupil instructional staff and administration expenses. In fact, spending on all staff in year 1 exceeded projections by an average of 10 percent for the 2012 cohort and 5 percent for the 2013 cohort.[36]

Expenses associated with retrofitting facilities also proved challenging to predict. Of the six schools that had to pay for facilities upgrades, only one anticipated that expense. Even that school underestimated the expense by more than $40,000. In some schools the upgrades were relatively inexpensive, but most were substantial (the median expense on upgrades was $18,094). These upgrades ranged from modifying space that students could use for "flex" learning time to full building renovations.[37]

4. When faced with financial trade-offs, schools tend to protect human capital and reduce technology spending.

Some proponents of using technology to personalize learning have argued that computer-based instruction can allow schools to create more efficient staffing arrangements.[38] For example, if half of a class is working independently on computers, the teacher can work with the other half, in theory allowing him to teach twice as many students. Another option is that class sizes could increase slightly and schools could theoretically gain the benefits of both small-group instruction and larger instructional staff-to-student ratios.[39] Some organizations, like Rocketship Education and Carpe Diem, have also experimented with increasing student-to-teacher ratios by creating large labs in which several instructional staff members oversee large numbers (sometimes upwards of 100) of students working independently on computers.[40]

Many of the schools in our study employed small-group work (with and without computers) as a component of their models, but almost all also remained committed to small class sizes, believing that relationships are key to personalization and that small student-to-teacher ratios facilitate strong student-adult relationships. One school leader expressed this sentiment when he explained why they kept student-to-teacher ratios low: "We put our money where our mouth is when we talk about building relationships with kids."

Most schools in our sample operate at lower student to instructional staff ratios than originally planned, partly because of missed enrollment projections and partly because of mission.[41] Based on their planning documents, the projected median student-to-instructional staff ratio for schools' first year of operation (aggregated across both cohorts) was 16.1, but when they opened their doors to students, the median ratio fell to 12.5.[42] One school that missed enrollment projections by 14 percent (55 students) in its second year operated at a student-to-instructional staff ratio of 10.5, compared to the planned 16.3. Another school under-enrolled by 22 percent (40 students). This school adjusted its staffing to maintain its planned student-to-*teacher* ratio but hired more *non-teacher* instructional staff than projected, in effect halving its student-to-instructional staff ratio from a projected 16:1 to an actual 8:1.[43]

How did schools pay for unintended staffing and facilities expenses? Philanthropic support, reductions to operations and IT spending, and savings from shedding paper-based curriculum (e.g., textbooks, workbooks, worksheets) enabled most school leaders to maintain low class sizes and invest in some technology (albeit less than they anticipated). One CMO leader explained that he felt little incentive to increase class sizes because the per-pupil budget

was almost the same as it had been at a non-PL school he had led. By shifting the spending on textbooks and copying toward inexpensive technology, he was able to maintain budget equilibrium, keep class sizes low, and buy essential IT materials.

The private support that all schools in this study received unquestionably eased tradeoff decisions. But as private dollars continue to diminish and teaching staffs become more expensive as they gain experience, these schools will likely face hard choices between small class sizes and other aspects of their model. Many school leaders, however, do not see larger class sizes as a way to reduce future spending and free up resources to invest in other areas, such as digital content, devices, and systems. Instead, leaders expressed that they prefer to keep administration lean, or cut administrative positions to protect both teaching positions and small classes. Three NGLC schools reported cutting a data leadership position when revenues fell short. Schools made these cuts despite some research finding that interpreting the data produced by the digital content is a paramount challenge for teachers and leaders implementing blended and personalized learning.[44]

To free up resources for technology investment, one middle school intentionally operates with class sizes that exceed the norm by a substantial margin. In year 1, the average student-to-teacher ratio in that school was 35 and in year 2 it was 38.[45] Financially, the model paid off—the school's CMO was able to amass a $1 million surplus. However, the school suffered significant teacher turnover after its first year of operation and its leader acknowledged that the large number of students in the class was one significant factor.

A leader of a different school said that he would have to consider increasing class size in the near term to pay for more digital content to help motivate students when they work independently on computers. Schools like this are just beginning to experiment with tradeoffs between class size and technology and it remains unclear what the impact on staff and students will be.

Schools also reduced spending on technology when human capital expenses were higher than anticipated. Across our sample, schools spent 44 percent less on software than they anticipated.[46] Schools, however, may continue to use technology even as they reduce spending on it. Many schools sought free or low-cost options or dropped non-essential technology tools in an attempt to find savings when facing lower than anticipated revenues. One school, preferring to maintain low student-to-teacher ratios, chose to rely almost exclusively on free software. Other schools managed to negotiate extraordinarily low leases for software from vendors that were motivated to work with NGLC schools.[47] Another school saved thousands of dollars by cutting its contract with a software and technical support provider. Individual schools also reduced technology expenses by opting for less expensive hardware (see box, "The Chromebook Effect").

Though schools lowered their IT spending to accommodate higher spending on staff and facilities, to some extent the availability of freeware and constantly falling prices for hardware allowed schools to reduce their spending on technology and maintain technology-enhanced components of their personalized learning models. Still, it is clear that some schools have sacrificed potentially valuable technology tools, particularly data analysis tools. The use of data to group students by common learning challenges, for example, could be a major source of learning gains in PL schools. In addition, freeware, at least for now, does not replicate sophisticated adaptive tools such as DreamBox's math instruction software. Relying solely on freeware to keep technology spending down constrains the ways in which a school can use technology to personalize learning (see box, "Freeware Can Only Do So Much") and may place a greater burden on teachers to supplement weak or fragmented resources.

THE CHROMEBOOK EFFECT

The low price point and strong performance of the Google Chromebook and Google's related suite of software has had an impact on technology spending in personalized learning schools. These low-cost devices substantially reduce what schools need to spend for student and teacher devices. A tradeoff is that Chromebook's reliance on cloud computing places a high demand on bandwidth and requires an up-front investment in network and bandwidth upgrades.

But Chromebooks don't make sense for every PL school. For example, two secondary school leaders described their models as project-based learning with an emphasis on engineering and digital content, respectively. These subjects require software that can only operate on more powerful—and more expensive—computers. Schools like these need to spend about $1,000 per student on laptops and software, compared with schools that can rely on Chromebooks at $250 per student.

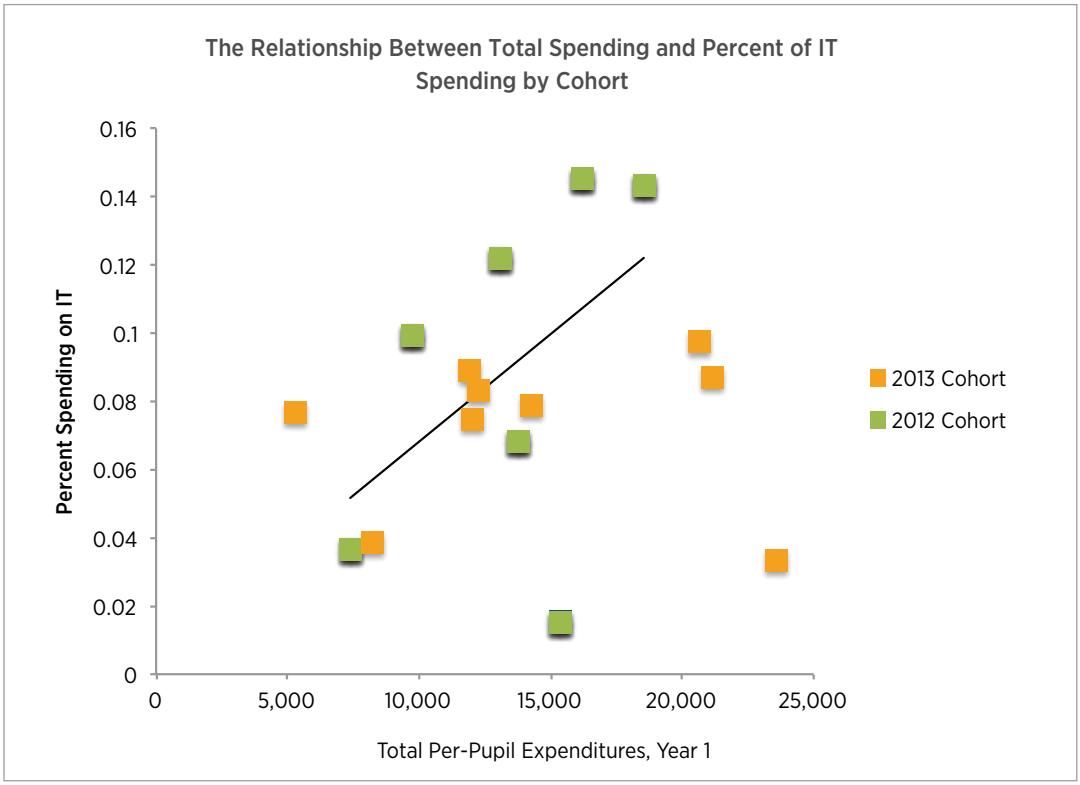
FREEWARE CAN ONLY DO SO MUCH

Getting What You Want Often Costs Money

Many schools in the 2013 cohort wanted dashboards that would integrate assessment data from multiple content providers into student and classroom snapshots. This turns out to be technically very challenging and unavailable through free or low-cost sources. Only two schools succeeded in developing these tools—one with the support of substantial in-kind support and another for about $150,000. In these early days of personalized learning, schools will likely need to invest in customized software. As these tools continue to develop and gain popularity, they will likely be available for affordable prices. It remains unclear whether these tools will ever be available as freeware.

For now, it appears that technology is treated as a luxury good—schools pay for it when they have extra money to spend and reduce spending on it when they are short on resources. The highest-revenue schools tend to spend proportionately more on technology than do the low-revenue schools, particularly for the 2012 cohort (see Figure 3). For example, the two schools with the highest total per-pupil spending in the 2012 cohort allocated over 13 percent of their funding to IT—twice the average allocation of the two lowest total per-pupil spending schools.[48]

Figure 3. High-Spending Schools Tend to Spend More on IT



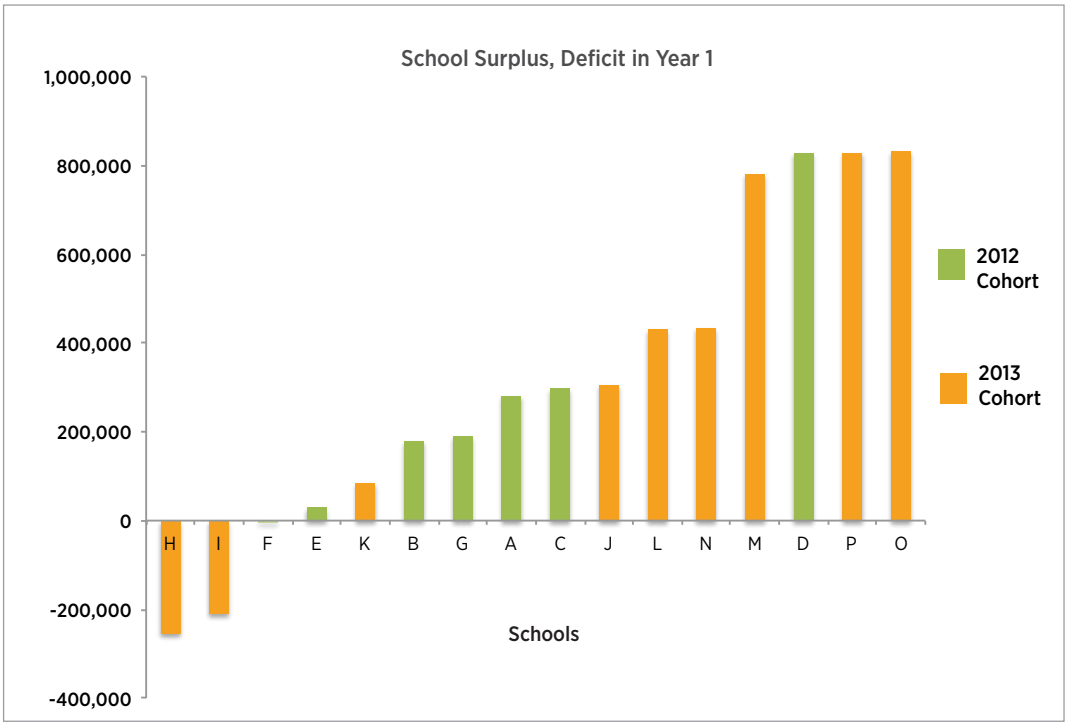
5. Schools appear to be reducing their reliance on private supports, but their long-term financial sustainability is still unclear.

The shift from launch mode to sustainability is crucial, and the schools in our sample are still in early days. As schools move from year 2 to year 3 and private funds dry up, they will transition to a smaller per-pupil budget. As teachers gain seniority, they will likely expect salary increases, also driving up costs. However, some costs, like administration and hardware infrastructure, are likely to decrease as schools establish themselves and realize economies of scale.

Most schools in the two cohorts balanced their budgets, and 13 of the 16 even ran surpluses during their first year of implementation (see Figure 4). Additionally, all five of the schools for which we have data through their second year of operation used private funding to cover a smaller percentage (15 percent) of their total expenses in their second year of operation than they used in their first year. By these measures, the NGLC schools appear financially healthy, but the real test will be when they are faced with paying the bills with public revenue alone.

After the first few years of operation, schools will have most non-recurring expenses behind them. As enrollment grows, the schools are developing economies of scale that will help them pay for recurring administrative and facilities expenses. Still, some schools in our sample have very large gaps to bridge between current spending and sustainable spending.

Figure 4. Most PL Schools Ran Budget Surpluses



To examine sustainability, we compared the recurring expenses schools can expect to incur every year (once they've put NRE behind them) to the total recurring public revenue a school can expect to receive each year.[49] That is, if we ignore the extraordinary up-front spending required to launch these schools, are the schools able to cover the rest of their expenses (for teachers, administrators, software, hardware replacement, facilities, etc.) solely through recurring public funding?

This view of ongoing expenses shows a mixed picture (see Figure 5). Seven of the 16 schools covered recurring expenses with public funding in their first year of operation, while only three of the five schools providing data for the second year of operation did so.[50]

Figure 5. Despite Budget Surpluses, Many Schools' Spending Patterns Are Not Currently Sustainable on Public Funds

The gap between the total recurring expenses and the total public revenue shows how much private money is needed to keep the school operating after all of the one-time expenses have been incurred. For example, one school used about $6,726 per student of private funding to cover its recurring expenses in year 1. This school may be an extreme example but as Figure 5 shows, it is not the only school that will need to make serious adjustments to either public revenue (through higher enrollment) or expenses—probably both—to sustain.

Of course, these are early days for these schools. The test for many will come in their fourth year of operation when most schools expect to reach their maximum enrollment. By this point, all but 4 of the 16 schools expect to operate without private funding.

MAXIMIZING FUNDING OPTIONS

As some schools in our sample demonstrate, personalized learning models can open doors to other types of innovation that maximize resources and reduce costs.

Several schools took advantage of their Silicon Valley locations and partnered with local technology giants for software engineering and development support. Another school maximized state per-pupil aid by teaching students online when they are absent due to mild illness, weather-related closures, or travel, instead of foregoing public funding when students are absent.[51] The principal estimates that the school retained about $40,000 in state aid from this program.

Other cost-cutting strategies we learned about include negotiating a deal with the host district for free facilities and personnel support, keeping administration lean by sharing administrative responsibilities with all adults in the school, and eliminating alternative education programs and integrating those students with everyone else at the school (saving one school $600,000 per year).

Conclusion

NGLC schools provide lessons for new PL school leaders and cautious optimism for the financial sustainability of PL models. These are the early days of personalized learning. The schools we studied are paving the way for more widespread experimentation and, we hope, greater opportunities for students. What we learned is important: spending to implement a personalized learning program is, to some degree, based on the amount schools are able to invest. Though some schools are spending a lot to launch and implement personalized learning models, many are spending closer to national and local averages. While some schools are heavily reliant on philanthropy, others are well on their way to funding personalized instruction through public resources alone. This should be cause for optimism, but it begs an important question that goes beyond the scope of this study: how do different levels of investment and different decisions about resource allocation correlate with academic results? A recent RAND study showed positive outcomes in math and reading for NGLC grantee schools when compared to similar schools using traditional instruction, but more research is needed to learn how spending impacts outcomes.[52]

Along with optimism, these findings also offer some cautions. First, all of the schools in our sample received private funding to launch their school with personalized models. Moreover, in all but one case, the schools in our sample were new schools free of any traditions or legacies to change. This

will not be the case for most schools as these efforts begin to scale up across the country. We will need to understand how existing resources can be applied to cover the operational and staff development expenses associated with the implementation of personalized learning. We will also need to better understand what supports staff will need to successfully change their instructional model and their students' expectations for what their learning experience should be.

Second, the schools we studied are, in many ways, still wedded to a very traditional resource allocation model. At least for now, the technology tools seem to be treated as an add-on luxury and shed or traded for free—and often less functional—products in the face of budget shortfalls. This is a worrisome trend for those who feel technology holds great potential to help teachers personalize their students' instruction. Time will tell if technology tools will win the confidence of educators, who must see them as essential components of students' experience and as tools that can free up resources for additional student supports, higher teacher salaries, or other assets to improve student learning. Hopefully, researchers and support organizations can be useful thought partners to schools as these efforts continue.

Appendix A: Complete Sample of 2012 and 2013 Cohorts of the NGLC
(actual school names kept anonymous)

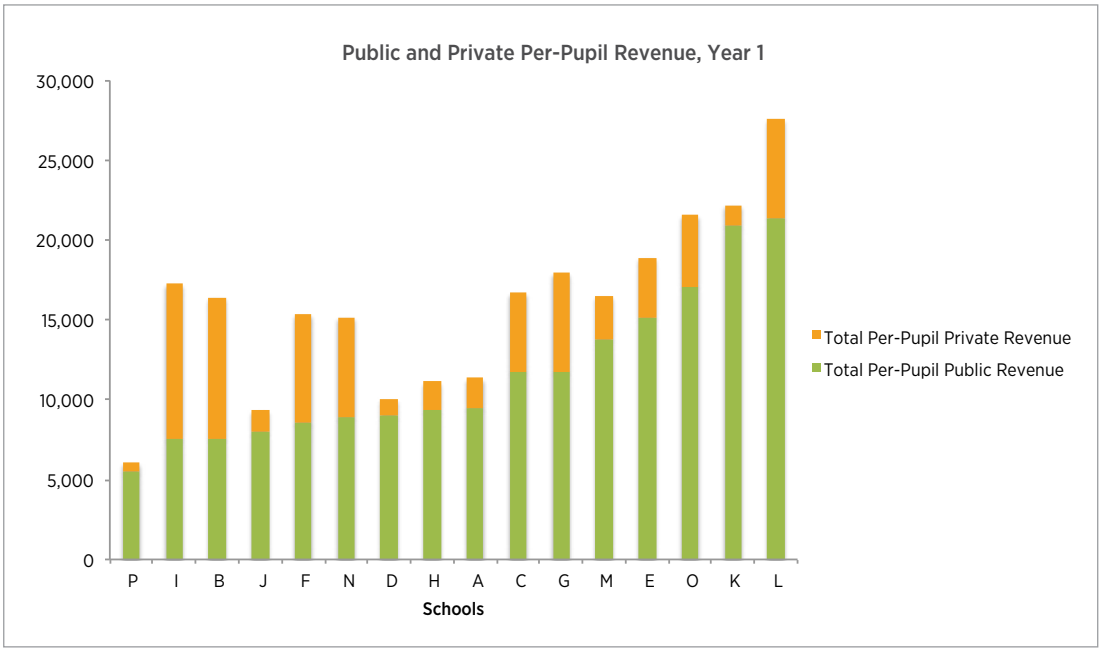
2012 Cohort	New, Turnaround, or Redesign	Operator	Grades Served at Capacity	Years of Forecast Data	Years of Data (actuals)
School A	New	Charter	6-8	FY 2012-17	FY 12, 13, 14
School B	New	Charter	9-12	FY 2012-17	FY 12, 13, 14
School C	New	Charter	5-8	FY 2012-17	FY 12, 13, 14
School D	New	Charter	9-13	FY 2012-17	FY 12, 13, 14
School E	New	Charter	6-12	FY 2012-17	FY 12, 13
School F	New	Charter/ Partner Organization	8-12	FY 2012-17	FY 12, 13
School G	New	Charter	9-12	FY 2012-17	FY 12, 13, 14
2013 Cohort	**New, Turnaround, or Redesign**	**Operator**	**Grades Served at Capacity**	**Years of Forecast Data**	**Years of Data (actuals)**
School H	New	Charter/ Partner Organization	K-8	FY 2013-18	FY 13, 14
School I	New	Charter	9-13	FY 2013-18	FY 13, 14
School J	New	Charter	9-12	FY 2013-18	FY 13, 14
School K	New	Charter	6-12	FY 2013-18	FY 13, 14
School L	New	Charter	PK-8	FY 2013-18	FY 13, 14
School M	New	Charter	7-12	FY 2013-18	FY 13, 14
School N	New	Charter	6-12	FY 2013-18	FY 13, 14
School O	New	Charter	6-12	FY 2013-18	FY 13, 14
School P	Redesign	Charter	5-12	FY 2013-18	FY 13, 14

Appendix B: Revenues in Sample Personalized Learning Schools

School administrators interested in implementing personalized learning for every child may reasonably wonder how much it costs and how realistic PL implementation is without grant supports. Resources are constrained everywhere and training staff for a new way of teaching, altering school facilities, adding to the school's broadband capacity, and ensuring that every child has regular access to a computer all come with costs.

The schools in our sample experienced these expenses and others associated with personalized learning. But several of them embarked on this work with revenues near or even below the 2013 national average expenditure of $12,000 per student, even with private funding.[53] Schools in our sample implemented PL with total revenues ranging from as little as $6,100 per pupil in a fully virtual school and $9,400 in a brick and mortar school to over $27,000 per pupil (see Figure B1 for per-pupil revenue in the schools' first year of implementation).

Figure B1. Public, Private, and Total Per-Pupil Revenue Vary Meaningfully



Different state and local funding across states explain much of this gap (e.g., New Jersey schools receive twice as much state and local funding as Kentucky schools). As Table B1 shows, private funding in many of the schools bumps total revenues to exceed local school district averages by substantial margins.

Table B1. Revenue in Sample Schools and District Comparison Schools[54]

School Name	Per-Pupil Revenue	District Comparison	Percent Difference
School P[55]	6,104	15,452	-153
School E	18,913	30,784	-63
School D	10,073	12,002	-19
School J	9,369	10,750	-15
School K	22,197	23,752	-7
School F	15,382	15,434	0
School H	11,130	10,762	3
School B	16,427	15,434	6
School C	16,710	15,434	8
School A	11,361	10,341	9
School M	16,508	14,294	13
School N	15,194	12,479	18
School O	21,567	17,648	18
School G	17,965	12,605	30
School L	27,548	17,953	35
School I	17,266	7,583	56

Public funding accounted for an average of 74 percent of the year 1 revenues in the schools' first year of operation. This revenue includes local, state, and federal funding, including additional funding directed to schools that serve high proportions of students that qualify for free and reduced-price lunch (FRL), English Language Learners (ELL), and special education students. Extra public funding associated with these populations, which schools must use to serve their high-needs students, accounts for about 6 percent of total revenue in the sample schools.[56] Title I funding for low-income students can be used for schoolwide needs, including PL implementation, when more than 40 percent of a school's students qualify for FRL. One principal in our sample used Title I funds to pay for most of the school's software licensing and computers.

The schools in our study also generated considerable grant support. For some schools, grants from private donors are substantial and include more than just the NGLC grants (see Figure B1). On average, schools in our sample received $4,237 per pupil in private funding in the schools' first year of operation, which comprised 26 percent of total revenues.[57] In 6 of the 16 schools, private grants brought in more than $6,000 per pupil, accounting on average for more than 40 percent of these 6 schools' total budgets.[58] State grants were relatively small (no school received more than $615 per pupil in the first year of implementation) and only five schools in our sample received such grants.[59]

Whether the revenue source is public or private, these one-time grants are fleeting. In the five charter schools for which we have two years of actual revenue data, the average one-time grant funding from both public and private sources fell by more than half in schools' second year of operation, when considered on a per-pupil basis.[60]

Our assessment of revenue does not account for in-kind resources. Based on interviews, six schools in the sample received some form of in-kind support during their first year of implementation. Support for at least two of these schools came from individuals with technical expertise and added up to sizable contributions. One school in our sample received the assistance of 6 to 12 software engineers, estimated at about $2.1 million of in-kind support. Another charter school received free use of a facility from its host district.

Appendix C: Non-Recurring and Recurring Expenditures

Expenditures Considered to be Non-Recurring	Expenditures Considered to be Recurring
IT services: Contracted IT consulting services	**Salaries and benefits:** Admin/ ops staff
Infrastructure: One-time infrastructure upgrades	**Salaries and benefits:** Instructional staff
Computer/ personal device students: Total costs	**Wages and benefits:** Hourly staff
Computer/ personal device staff: Total costs	**IT services:** Contracted IT support
Operating other: Consulting services	**IT services:** Other
Facilities: Interior or exterior retrofitting	**Infrastructure:** Recurring- wiring
Facilities: Other costs to convert to breakthrough model	**Infrastructure:** Recurring- wireless access
Facilities: Other one-time costs	**Infrastructure:** Recurring- switches, firewalls, tools
Facilities: Furniture, fixtures & equipment	**Other hardware:** Servers
Facilities: Mortgage principal	**Other hardware:** Server maintenance
Facilities: Capital expenditures	**Other hardware:** Printers
	Other hardware: Phones
	Other hardware: Classroom tools
	IT: Digital curricula
	IT: Instructional systems
	IT: Data
	IT: Talent management
	IT: Other costs
	IT: Digital content
	IT: Other software
	Operating Other: Non-digital content
	Operating other: PD
	Operating other: Other educational support
	Operating: Educator support (PD, other)
	Operating other: Fees for support services (CMO/District)
	Operating other: Other fees to CMO/District
	Operating other: Food service
	Operating other: Transportation
	Operating other: Contingency
	Operating other: Other
	Facilities: Rent/ lease
	Facilities: Mortgage interest
	Facilities: Custodial and cleaning
	Facilities: Utilities
	Facilities: Maintenance
	Facilities: Other Recurring Costs

Endnotes

1. One such challenge is Baumol's Cost Disease, or an increase in salaries over time despite stagnant productivity in a given field.

2. Another secondary school uses volunteers to provide each student with at least two hours a day of individualized tutoring. In addition, every student has access to a Chromebook, which teachers and tutors use as tools to support teaching and learning.

3. The school that did not open as a new school was a fully virtual school.

4. Thirteen of these interviews were with charter school leaders whose schools are located in seven states.

5. Calculated based on estimates of total 2013 revenue of $597,929,599,000 as reported by the *Public Education Finances: 2013. Economic Reimbursable Surveys Division Reports Public Education Finances: 2013,* Educational Finance Branch, June 2015. G13-ASPEF and the 2012-13 total enrollment as reported by U.S. Department of Education, National Center for Education Statistics, Common Core of Data (CCD), *State Non-Fiscal Survey of Public Elementary/Secondary Education,* 2000-01 through 2012-13; and *State Public Elementary and Secondary Enrollment Projection Model,* 1980 through 2024. See *Digest of Education Statistics 2014,* tables 203.20, 203.25, and 203.30.

6. When three years of data are available, the data are for the 2012, 2013, and 2014 fiscal years.

7. See Data, Methods, and Limitations section for a description of how we determined this sample, and Appendix A for sample school characteristics.

8. All three of these schools were in the 2013 cohort. Two of the schools were district schools; the other was a charter school.

9. This table provides data from the sample of 16 charter schools in the schools' first year of operation. Because many schools in the sample are growing one grade at a time, enrollment numbers shown here are substantially lower than they will be in several years, when schools in the sample reach their full enrollment.

10. Additionally, we interviewed seven district school leaders. District schools were ultimately excluded from the study, but interview data with district school leaders contributed to our broad understanding of the successes and challenges that school leaders have encountered while implementing PL.

11. Data in this study differ from the broader body of publicly available financial data in that the former are self-reported and the latter are prepared using somewhat different assumptions and for different purposes. For example, a typical financial analysis of district schools estimates how much central spending on some expense (e.g., professional development) was applied to a school by prorating the total spending to the number of teachers or students in the school. In contrast, the self-report of professional development costs in our study reflect actual spending in the school building.

12. That districts spend what they get isn't strictly true. Nationally, revenues exceed expenses by about $1,400 per pupil. The gap between revenue and expense, however, is typically an artifact of accounting in which per-pupil expense typically excludes expense for debt service.

13. The small sample of five schools for which we have a second year of expense data again reveals a significant but smaller range of spending that aligns with the narrower range in revenue across this smaller sample.

14. IT costs include all spending on hardware, software, and tech infrastructure such as wiring, firewalls, and fees related to internet access.

15. Spending on consultants equaled $428 per pupil in schools' first year of operation, calculated using year 1 enrollment.

16. The five schools for which we have a second year of operations data spent an average of approximately $134,000 on consulting services. Four of the five schools spent considerably more—the fifth school reported zero spending in this category during its second year of operation.

17. This analysis excludes the virtual school in the sample, which does not serve students in a brick and mortar building.

18. This excludes one charter school located in Newark, which reported that it spent 100% of its year 0 funding on facilities.

19. The school spent nothing on facilities during its planning year and spent only 15% ($270,400) of its total expenses on facilities during its first year of operation. By comparison, all other brick-and-mortar schools in the study spent an average of 18.7% of their total expenses on facilities in their first year of operation.

20. Nationally, schools spend about 7.5% of their budgets on facilities. The NGLC schools in our sample spent about 16%.

21. Not all schools spent on student devices. This average only includes per-student device costs from those that did spend on student devices.

22. Predictably, schools in their second year of operation spent less—on average, less than $6,000.

23. The 2013 cohort spent more on facilities than operations during their planning year. In all other years and cohorts, schools spent more on operations than facilities.

24. We used data from the U.S. Census Bureau American FactFinder to sum federal, state, and local funding for the districts in which the NGLC grantee schools are located. These revenue data include Title I funds, nutrition, government formula assistance, transportation, other, local taxes, property taxes, and parent government contributions from 2013, the most recent year for which data are available.

25. We estimate computer replacement rates to be once every four years, so we include one quarter of teacher and student computer costs in calculations of "launch" expenses.

26. All schools but the virtual school in our sample were new start schools.

27. We did not include in this analysis year 0 NRE data from one 2012 cohort school due to an error in data reporting. Full enrollment is defined as the total enrollment the school expects to reach once it has added all of the grades that it currently intended to enroll.

28. These schools' per-pupil NRE equal $192 and $1,175, respectively, when calculated using projected full enrollment. We also recorded $105,000 in unspecified operating expenses.

29. We consider *all* costs incurred in the planning year to be NRE. This includes salaries and benefits because, although, those employees may continue to work at the school, their job description changes substantially when students enter the building. Notably, year 0 NRE drops to about $72,000 when we calculate it without salaries and benefits, as we do in subsequent years.

30. These calculations exclude schools that reported spending in any of these categories to be 0% or 100% of their spending, as we presume this to be an omission or error in reporting.

31. Reporting of professional development (PD) spending did not differentiate between one-time PL training and on-going professional development. Because most schools provide PD on an ongoing basis, we classified PD expenses as recurring. However, we discuss PD costs in this section because we recognize that training and professional learning costs may be particularly high and important to consider during the launch phase.

32. Per pupil, year 1 NRE totaled $326 when calculated using projected full enrollment, or $1,495 calculated using year 1 enrollment.

33. The schools that spent on consultants in their second year of operation spent, on average, $167,000.

34. Six of the seven schools in the 2012 cohort and six of the nine schools in the 2013 cohort fell short of their enrollment projections.

35. Many schools did, however, modify their projections after their first year of operation to bring their enrollment estimates closer to reality.

36. This number increases to 17.5% when only examining the six (of nine) charter schools in the 2013 cohort that under-anticipated their per-pupil salary.

37. Median per-pupil (considered at anticipated full enrollment) retrofitting costs for those that incurred the expense were $30.

38. Suzanne Simburg and Marguerite Roza, *Innovating Toward Sustainability: How Computer Labs Can Enable New Staffing Structures, and New Savings* (Washington, DC: Edunomics Lab, Georgetown University, 2012).

39. Ibid.

40. Ibid.

41. In addition to teachers, "instructional staff" includes paraprofessionals, coaches, and other instructors that may not be certified or work full-time.

42. We use median, rather than mean, in this analysis because one outlier school that preserved large class projections substantially pulled up the average. Projected student-to-instructional staff ratios for the first year across both cohorts equaled 15.7 and actual ratios equaled 13.3. The student-to-instructional staff ratio dipped below ten in four schools, and one school that relies heavily on young tutors fresh out of college has an instructional staff-to student ratio of 4.

43. The school's actual student-to-teacher ratio in its first year of operation was 22, compared to its projected 21. Student-to-teacher ratios were predictably higher than student-to-instructional staff ratios, but the differences between projected and actual ratios were similar in magnitude: the median projected student-to-teacher ratio was 20.4, the actual ratio was 16.8.

44. Brian Greenberg, Leonard Medlock, Darri Stephens, *Blend My Learning: Lessons Learned from a Blended Learning Pilot* (Oakland, CA: Envision Schools, Google, Stanford University D.School, 2011).

45. Student-to-instructional staff ratio was 25 and 26 in years 1 and 2 of operation, respectively.

46. Total software costs were calculated by summing reported values for: IT: Digital Curriculum, IT: Instructional Systems, Digital Content, and Other Software.

47. In some cases, leaders negotiated special rates with vendors that were so rare that their contracts barred them from revealing the terms of these contracts. Given that vendors were motivated to work with these leading schools, however, means it is unlikely that subsequent schools could reap such benefits.

48. The two highest-spending schools spent an average of 11.7% on technology in their second year of operation, while the two lowest-spending schools spent an average of 3.88%. It is, however, important to remember that we only have second operation year data for five charter schools.

49. For a list of one-time and recurring expenses, see Appendix C.

50. There is some, but not complete, overlap between the 2012 cohort schools able to cover recurring expenses in year 1 and year 2.

51. When the school is closed because of inclement weather, teachers are expected to log onto the school's learning management system (LMS) by a specified time each morning to post assignments for the day, respond to student inquiries, monitor message boards, and provide instruction. The school requires student participation as well.

52. John F. Pane, et al., *Continued Progress: Promising Evidence on Personalized Learning* (Santa Monica: CA: RAND Corporation, 2015).

53. Calculated based on estimates of total 2013 revenue of $597,929,599,000 as reported by the *Public Education Finances: 2013. Economic Reimbursable Surveys Division Reports Public Education Finances: 2013,* Educational Finance Branch, June 2015. G13-ASPEF and the 2012-13 total enrollment as reported by U.S. Department of Education, National Center for Education Statistics, Common Core of Data (CCD), "State Non-fiscal Survey of Public Elementary/ Secondary Education," 2000–01 through 2012–13; and State Public Elementary and Secondary Enrollment Projection Model, 1980 through 2024. See *Digest of Education Statistics 2014,* tables 203.20, 203.25, and 203.30.

54. This table shows combined per-pupil public and private revenue from the NGLC schools in their first year of operation. The district comparison shows 2013 average per-pupil public spending in the districts in which the NGLC schools are located.

55. Because the virtual "School P" is not geographically based, this district comparison refers to the district in which the school is headquartered.

56. These funds were not uniformly distributed among schools. The sum of all of these funds allocated to the 16 sample schools in their first year of operation divided by the sum of total revenue across the schools that year is 5.8%.

57. Notably, per-pupil private funding reported by the 16 charter schools included in this report was five times as large as in the six district schools that we excluded from our analyses.

58. This figure was calculated by dividing the average per-pupil private revenues in the schools receiving over $6,000 per pupil in private funds and by the average total revenue in these schools.

59. Additionally, two of the six district schools that we excluded from our broad sample received state grants.

60. One-time public grants for the 2012 cohort of schools for which we have two years of operational data fell from an average of $327 per pupil in schools' first year of operation to $151 per pupil in schools' second year of operation. The average amount of per-pupil private funds received by these schools in their first year of operation was $4,571. In their second year of operation this number was $2,217.

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