

Opening New Pathways

Evidence of Learning Acceleration in Public Virtual and Hybrid Models

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Credit: Allison Shelley, EDUImages

Executive Summary

Across the country, families seek alternatives to traditional school models, demanding more flexible and relevant options. For some, core subjects often feel disconnected from students' interests and goals. For others, rigid schedules or limited course offerings constrain opportunities. Virtual and hybrid learning (VHL) has emerged as one option to address this demand, allowing public school systems to offer meaningful choice while keeping students enrolled. However, too often, these models have been dismissed as a second-best solution.

To build a rigorous evidence base, and further establish VHL as a viable solution, FullScale conducted a mixed-methods study of five promising, public school models intentionally designed to meet students' needs in specific contexts. **Within each model, and across them all, we found clear evidence that they not only accelerate learning for students, but their students outperform peers in comparable brick and mortar settings.**

Producing Evidence of Learning Acceleration

Our mixed-methods study, conducted during the 2024-25 school year, presents evidence for a different narrative about virtual and hybrid learning. **When designed well, these models accelerate learning, build belonging, and effectively serve diverse student populations.** Many meet the needs of students who often find themselves at the margins, either excelling academically and requiring more advanced coursework, or struggling in traditional settings that fail to provide sufficient support. Given this dual challenge, the performance of students enrolling in these models can often feel invisible.

Across all five of the sites participating in our study, students consistently outperformed peers in comparable brick-and-mortar schools on measures such as GPA, credits earned, graduation readiness, standardized assessments, and course pass rates. Just as importantly, the students—and their teachers—reported experiencing high-quality experiences characterized by self-directed learning, effective pedagogy, strong relationships, and a deep sense of community and belonging.

Five VHL Models Serving Students Well

In addition to holistically outperforming comparison groups, each model demonstrated evidence of accelerating learning for the specific student populations they intended to serve. Full evaluation details are available through the linked site names in the Appendices.



Bismarck Public Schools' Empower[Ed] (ND): A competency-based, hybrid model, Empower[Ed] re-engages learners who felt unsupported by traditional high school by having them master core academic standards through interest-driven projects, many of which are developed in partnership with, or in service to, the local community. Students in the program achieved higher GPAs, earned more credits, and were more likely to graduate on time as compared to their peers.



Da Vinci Connect TK-8 (CA): An ungraded, hybrid, homeschool model, Da Vinci Connect empowers students and families to co-design learning pathways that meet academic standards through content that is both relevant and interest-driven. Teachers provide training and coaching to families, offering multiple curricular options and tools to support learning at home and on campus. Analysis revealed that students outperformed state averages on SBAC Math and ELA.



Friendship Collegiate Online (D.C.): A fully virtual high school, Friendship combines high-quality curricula, intentional community building, and individualized support from learning coaches to deliver rigorous, relationship-centered learning. This school serves a high population of historically marginalized learners, as well as students experiencing social anxiety, medical concerns, or poverty. In the 2024-25 school year, students showed significant growth on NWEA MAP compared to two comparison high schools. Notably, students with disabilities comprise a large share of the population and performed at rates similar to students without Individualized Education Programs (IEPs).



Novi Virtual (MI): A flexible, virtual program, Novi allows students to seamlessly transition from in-person learning to the online program, ensuring continuity for those traveling or needing more flexible options. The program also partners with neighboring districts to re-engage students who have been previously disengaged from traditional school due to chronic absenteeism, behavioral challenges, medical needs, or potential expulsion. Both Novi's own students and Partner District high school students outperformed state averages in course pass rates across core subjects, demonstrating the model's effectiveness.



St. Vrain Valley Schools AGILE (CO): The Advanced Global Interactive Learning Environments (AGILE) Program is a hybrid learning model serving students who virtually join classes in other schools within the district while physically attending their home school. Students in these satellite locations gather in person with peers while connecting virtually to a central classroom, allowing for both local collaboration and real-time engagement with teachers and students. This hybrid program expands access to specialized and advanced coursework across the district as well as rural schools throughout Colorado. Participating students reported higher GPAs and stronger PSAT/SAT performance. Notably, the relatively high percentage of learners identified as gifted thrived at scale.

A New Narrative about Virtual & Hybrid Learning for the Field

While academic outcomes provide an important metric for understanding student learning, they do not tell a complete story of how students experience education or the quality of those opportunities. The findings from these five sites demonstrate that **innovation within public systems is not only possible, but essential** if we want students who are often furthest from opportunity to have access to high-quality learning. For too long, virtual and hybrid models have been treated as temporary fixes or peripheral options. Our research shows that, when designed thoughtfully, they can provide rigorous, equitable, and durable pathways for students whose needs may not be met by the traditional model of schooling.

Across these diverse models, we surfaced evidence of success as students outperformed their peers—a promising sign that when matched well to student needs, VHL can support learning acceleration. **This suggests that the question is not whether virtual or hybrid learning can work, but rather how well the right model fits the right student.**

Equally important, these programs expand choice and access for families in contexts where the traditional model has come up short and serve as models for innovating within public school systems:

- They serve diverse learners well—from rural students identified as gifted, to youth with disabilities, to those previously disengaged by traditional models of learning.
- They demonstrate that choice and flexibility improve outcomes across urban and rural contexts, conservative and progressive communities, and both affluent and low-income settings.
- They embed career and technical education (CTE) and authentic, project-based learning alongside academics, proving that rigor and relevance can coexist.
- They foster a strong sense of community and belonging, with students consistently reporting comfort at school, feeling respected, and having strong connections within their school communities.

The lesson is clear—when public schools are given the space to innovate, align with community needs, and measure what matters, they can design high-quality virtual and hybrid models that accelerate learning for students.

Opening New Pathways

Evidence of Learning Acceleration in Public Virtual and Hybrid Models

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About FullScale

We unite education leaders and organizations together to drive collective learning, action, and systems transformation. We break silos, bridge divides, lift up new evidence and unseen innovations, and accelerate change for lasting impact for every learner.

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Evidence of Learning Acceleration in Public Virtual and Hybrid Models

Even before the pandemic, many students and families sought alternatives to the traditional school model. For some, core subjects felt disconnected from their interests and goals. For others, rigid schedules or limited course offerings constrained opportunities. The pandemic accelerated this demand for options, but did not create it. Families continue to call for models that are flexible, relevant, and responsive to their needs.

Virtual and hybrid learning (VHL) has emerged as one such option, gaining traction¹ nationally as a way for public school systems to offer meaningful choice while keeping students enrolled in their districts. These models show promise, but a central question remains: **how do we know if a VHL model is high-quality and [accelerating learning](#) for students?**

In many contexts, measuring VHL efficacy is not simple, since models often do not report their data separately from their whole-district or may have limited reportable outcomes due to varied enrollment structures (e.g. students remain enrolled in their home school so the program only has access to course-specific data). Compounding this, many of these models serve students who are often at the margins, either excelling academically and needing more advanced coursework or struggling with traditional models that are not designed to meet their needs. As a result, the performance of students enrolling in these models can often feel invisible.

To build a rigorous evidence base, FullScale conducted a mixed-methods study of five promising, public VHL models intentionally designed to meet specific student needs in specific contexts. **Within each model, and across them all, we found clear evidence that they not only accelerate learning for students, but their students outperform similar peers in comparable brick and mortar settings.**

Evidence of Learning Acceleration

Our goal was to understand how virtual and hybrid models accelerate learning for diverse groups of students in varied contexts. As described in an [earlier report](#), to accomplish this goal, we selected five public models that had early evidence of learning acceleration (Table 1) after conducting a national landscape scan of 64 high-quality VHL models. Each of the selected models serve distinctly different student populations, including students who had been disengaged from traditional schooling, those who would otherwise not have access to specialized or advanced courses due to being geographically isolated in their rural high school, or students experiencing anxiety or medical challenges.

These students are often hidden in aggregate reporting, their progress masked by districtwide averages. By focusing on models built specifically for these populations, we were able to shed light on how virtual and hybrid approaches create opportunities where the traditional system has struggled. This also made clear that measuring learning acceleration cannot follow a one-size-fits-all approach that relies solely on traditional assessments. Instead, it requires measures tailored to the context and responsive to the unique needs of the students each model serves.

1. Coffey, 2025

Table 1. Overview of Five Public Virtual and Hybrid Models

	Bismarck Public Schools Empower[Ed]	DaVinci Connect TK-8	Friendship Collegiate Online	Novi Virtual	St. Vrain Valley School District's AGILE Program
Location	Bismarck, ND	Hawthorne, CA	Washington D.C.	Novi, MI	St. Vrain, CO and rural schools in CO
Configuration	District Program	Charter School	Charter School	District Program	District Program
Number of Students Served	58	534	232	160	498
Grade Levels Studied	11-12	TK-8	9-12	7-12	7-12
Model Overview	<i>Hybrid</i> program for 11th and 12th grade students focused on core subject areas through student interests and passions.	<i>Hybrid</i> , ungraded program focused on real-world learning at home three days a week and in person classes two days a week.	Full-time <i>virtual</i> high school and supplemental course provider to partner schools.	Full and part-time <i>virtual</i> program with course access options for partner districts.	Offers course access where students attend their home school and engage in <i>hybrid</i> learning with a virtual class.
Unique Student Needs	Students who didn't see relevance in traditional models of schooling or who wanted to deeply explore and pursue topics of interest.	Students and families who want agency in how and what they learn with structure, support, and community.	Serves students who struggle with anxiety, medical concerns, and a high proportion of students with disabilities and those who have been designated as "economically disadvantaged." ²	Students who travel abroad for extended trips, those experiencing medical challenges, and students who would otherwise be disengaged from school due to chronic absenteeism or behavioral concerns.	Rural students who would not otherwise have access to specialized and advanced coursework.

2. The term "economically disadvantaged" is determined by a number of variables related to socioeconomic status including whether a student is receiving federal or local financial assistance, in the foster care system, designated as homeless, or overaged.

Table 2. Student Demographics by Model

Student Demographics	Bismarck Public Schools Empower[Ed] (n=58)	DaVinci Connect TK-8 (n=534)	Friendship Collegiate Online (n=232)	Novi Virtual (n=160)	St. Vrain Valley School District AGILE Program (n=498)
Black or African American	1.7%	14.4%	93.1%	10.0%	0.8%
White	96.6%	20.4%	3.0%	41.9%	71.9%
Asian	0.0%	5.2%	0.4%	43.1%	7.2%
Latine	0.0%	35.8%	0.0%	2.5%	16.5%
American Indian	1.7%	0.4%	3.4%	0.6%	0.60%
Native Hawaiian or Pacific Islander	0.0%	1.5 %	0.0%	0.0%	0.0%
Two or More Races	0.0%	22.0%	0.0%	1.9%	3.0%
Qualifies for Nutrition Support or Designated "Economically Disadvantaged"	13.8%	37.6%	73.7%	7.5%	Not Reported
Qualifies for Special Education Services	6.9%	13.9%	31.5%	6.9%	5.4%
Identified as a Multilingual Learner	0.0%	9.9%	Not Reported	2.5%	1.6%
Identified as Gifted	0.0%	Not Reported	Not Reported	Not Reported	28.1%

The Measurement Challenge

Measuring learning acceleration requires approaches that are responsive to context. Each model is tailored to the specific students they serve and, as a result, they have variation in the data they collect and monitor (Table 3). Some models track standardized measures such as NWEA MAP or state assessment data. Others focus on standards progressions, career readiness practices, or course grades.

As is the case throughout the field, limiting measures to only traditional means such as standardized test scores tells an incomplete story of what students achieve and how they experience learning. To address this, we customized our approach to incorporate both traditional indicators and broader, context-relevant measures, creating a constellation of evidence that others can learn from when studying their own contexts. By bringing together multiple measures and disaggregating by demographic variables, we can better understand what learning acceleration looks like in settings that operate anytime and anywhere.

What we mean by *learning acceleration*...

Since the pandemic, discussion of student learning has shifted from a narrative of learning loss to unfinished learning to learning acceleration. **Oftentimes, these framings take a narrow approach, focusing primarily on benchmark assessments in English/Language Arts and Math as outcomes.**

High-quality virtual and hybrid models aim to ensure that every student receives the targeted support they need to equitably access learning opportunities and gain mastery of expected skills and content (e.g., common standards, competencies). This may include approaches that seek to fill gaps in specific prerequisite knowledge as well as opportunities that create new access to learning experiences and support previously unavailable to students. Most important, **many of these programs create opportunities for learning that might not otherwise be possible.**

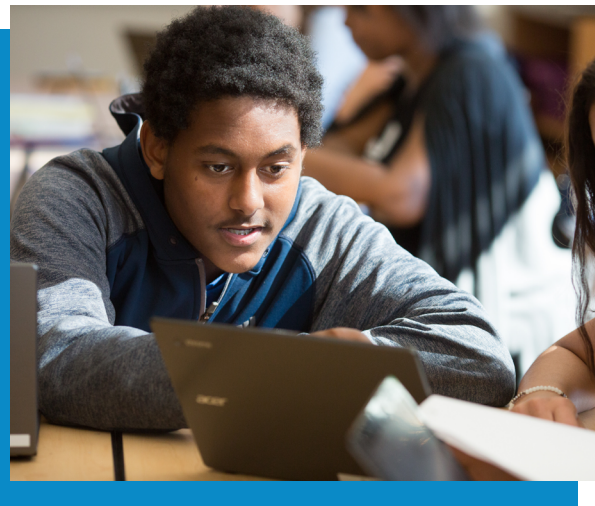
For these reasons, our measurement of learning acceleration will include **both** progress on more traditional assessments **and** broader, relevant measures that allow us to examine the degree to which students demonstrate the extent to which they have learned or acquired expected skills and content.

Table 3. Traditional and Broader Measures by Site

	Bismarck Public Schools Empower[Ed]	DaVinci Connect TK-8	Friendship Collegiate Online	Novi Virtual	St. Vrain Valley School District AGILE Program
Traditional Academic Outcomes					
Standards Progressions	X				
Credits Earned	X		X	X	X
NWEA MAP		X	X		
Standardized State Assessments		X			
AP Enrollment	X		X		X
On Track to Graduate	X		X		X
SAT/PSAT			X		X
Graduation Rates			X		X
Broader Relevant Measures					
Career Readiness Practices	X				
Attendance	X	X	X	X	X
Demonstrations of Learning	X	X			
Course Pacing	X		X		
Grades	X		X	X	X

In high school contexts, measurement presents additional challenges, as there are fewer consistent, systemwide indicators of achievement. To deeply understand what learning looks like in these environments, approaches to measurement should include broader, relevant measures. Where appropriate, traditionally collected data such as attendance, demographics, and grades also need to be thoughtfully disaggregated. For example:

- **Bismarck Public Schools' Empower[Ed]** program provides standards-based learning where students demonstrate mastery of standards to earn course credit. To understand students' progress, we used two unique forms of data: standards progression by course and Career Readiness Practice scores, otherwise known as durable skills.
- In **St. Vrain's AGILE program**, students gain access to courses that would otherwise be unavailable in their home school. To understand what learning acceleration looks like, we explored credits earned, grades, and pass rates.
- **Friendship Collegiate Online** was unique in our sample in that they used NWEA MAP three times during the year, providing insight into academic growth and performance in English and Math. In addition, they tracked both the number of activities students completed by course and course grades to illustrate progress as well as outcomes.
- High school students who attend **Novi Virtual** are often still enrolled in their home school, whether in Novi Community District or a partner district. As a result, the available data on these students is limited. Our analysis included course grades, attendance, and pass rates to contextualize learning acceleration against the backdrop that many of these students would not otherwise have access to any learning or were previously disengaged.



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Outperforming Comparison Groups

A key element in assessing whether students experience accelerated learning is comparing their outcomes to those of similar peers in traditional, brick-and-mortar schools. Because student populations and measures varied across sites, these comparisons took different forms for each model. Even so, a consistent pattern emerged—**across all five programs, students in public VHL models outperformed comparable peers in traditional settings.**

- **Empower[Ed]** students outperformed peers from a high-performing, local high school on GPA, credit attainment, attendance, and being on track to graduate, signaling that this model provides an effective option for students who may otherwise be disengaged from traditional learning. Analysis also revealed that Empower[Ed] students demonstrated mastery of content standards at an accelerated pace, moving from partial to near-total mastery across content areas in less than one academic year.
- Students at **DaVinci Connect TK-8** demonstrate high attendance rates and strong academic performance in both math and English Language Arts (ELA). Importantly,

students consistently outperformed state averages, which largely mirror Los Angeles County, on the state's Smarter Balanced Assessment Consortium (SBAC) test in math and ELA across all reported student groups.

- **Friendship Collegiate Online** students outperformed two comparison high schools on nearly every academic outcome, including NWEA MAP growth from fall to spring in ELA and in math. These differences suggest that Friendship Collegiate Online is accelerating learning for students at a greater rate in the virtual environment.
- **Novi Virtual** accelerates learning by providing access to courses and flexible pathways that engage students in situations where no other options are available. Both Novi's own students and partner district high school students outperformed state averages in course pass rates across core subjects, demonstrating the model's effectiveness in re-engaging students in learning when the alternative was likely not having access at all.
- By leveraging simple tools, such as a quiet space, a computer or tablet, and Cisco Webex conferencing hardware, **St. Vrain's AGILE** students from across the 411 square mile system—plus students from rural districts across Colorado—access specialized courses such as AP Art History, Cybersecurity, and Mandarin, which would not otherwise be available. Students who participate in AGILE outperform their peers from other schools in the district on GPA, PSAT, SAT, as well as have fewer reported behavioral incidents.

Serving Diverse Populations Well

In addition to holistically outperforming comparison groups, each model demonstrated evidence of accelerating learning for the specific student populations they designed their models to serve. These included:

- The **Empower[Ed]** program advanced gender equity in CTE pathways while sustaining rigorous academic results. Girls make up 48.3% of the Empower[Ed] population, slightly above national CTE averages.³ Gender-based analyses, using the Kruskal-Wallis Test— a nonparametric test used to make comparisons between multiple independent groups - revealed that girls significantly outperformed boys in GPA ($\chi^2(1) = 22.24$, $p < .001$) and in Career Readiness Practices ($\chi^2(1) = 6.48 - 9.97$, $p < .005$).
- Student attendance was strongly correlated with outcomes ($\rho = .288-.399$, $p < .001$) for students at **Da Vinci Connect TK-8**, with more frequent attendance linked to higher scores. Students receiving nutritional support, often used as a proxy for socioeconomic status, were more likely to have lower attendance and, in turn, lower achievement. Yet attendance was not associated with MAP growth percentiles, indicating that all students grew at similar rates regardless of attendance. Only a small correlation was observed between nutritional support status and growth in English ($\rho = -.152$, $p = .046$), suggesting that once students are engaged, growth trajectories are largely equitable across subgroups.
- At **Friendship Collegiate Online**, students with disabilities make up a larger share of the population than in comparison schools. However, unlike their peers, they grow at rates comparable to students without Individualized Education Programs (IEPs), demonstrating Friendship's ability to narrow performance gaps. For example, fall to spring NWEA MAP growth results show significant positive correlations between

3. U.S. Department of Education, Office of Career, Technical, and Adult Education, 2023

likely to have lower attendance and grades. However, subsequent analyses revealed that the longer students were enrolled in the program, the higher their attendance and grades. For Partner District students in particular, longer enrollment was significantly correlated with improvements in attendance and grades ($p = -.538$ to $.831$, $p < .001$), suggesting that the model can be effective, but it may take time for previously disengaged students to make progress.

- While only 8.2% of students in St. Vrain Valley Schools are formally identified as gifted, yet nearly one in three **AGILE** students (28.1%) hold this designation. At the end of the year, gifted AGILE students reported a mean GPA of 4.19 compared to 3.34 for their general education peers. AGILE demonstrates its ability to accelerate learning for rural students who need advanced or specialized coursework opportunities and would potentially not have access in the absence of this program.

These findings, coupled with holistic comparisons of academic performance, indicate that **these five VHL models are successfully accelerating learning for their students**. The mixed-methods study of each site can be found in Appendices E-I, presenting detailed evidence for the efficacy of these models for different groups of students.

Evidence of High-Quality Learning Opportunities



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While academic outcomes provide an important metric for understanding student learning, they do not tell the story of *how* students experience education or the quality of those opportunities. To better understand quality, we examined three core [drivers of effective virtual and hybrid learning](#): self-directed learning, effective pedagogy, and strong relationships.

To do this, we embedded prompts tied to these drivers into surveys (Appendix E) for students and teachers, administered in both fall and spring of the 2024–25 school year. The surveys asked respondents how frequently they experienced high-quality practices, giving us insight into not only *what* students achieved, but *how* they experienced learning within and across contexts. Tables 4 and 5 show the average frequency with which students and teachers reported experiencing these practices *often* or *always*, revealing consistent patterns across the year.

Across all three drivers, student and teacher survey results remained consistent from fall to spring, signaling that high-quality learning practices were sustained throughout the school year. Responses also skewed positive across the five sites, with very few participants selecting *not at all* or *rarely*, suggesting that these practices were a regular part of the learning experience.

Open-ended responses reinforced this picture. Our analysis of open response data revealed that high-quality practices matter in how students and their teachers view their success within the model. In the spring survey:

- **Self-directed learning** emerged as the most prominent theme, mentioned by 18 of 22 teachers and 163 of 428 students who responded to the prompt. For example, both groups described how students gained the skills and confidence to take ownership of their learning. An 11th grade student in the Empower[Ed] program explained:

Table 4. Students Indicating they Often or Always Experience the Quality Drivers of Virtual and Hybrid Instruction

Quality Driver	Survey Item	Percentage of Students who Indicated Often or Always	
		Fall (n=630)	Spring (n=525)
Foundation for Self-Directed Learning	I know what is expected of me to be successful in the program.	84.8%	89.9%
Effective Pedagogy	I feel connected to what we are learning in class.	70.0%	66.9%
	I take part in activities that meet my needs and help me to learn.	70.6%	71.4%
	My teacher provides clear and helpful feedback.	73.7%	84.1% ⁴
Strong Relationships	I set goals for my learning, either on my own or with the help of a teacher.	52.9%	61.4%
	I am able to provide suggestions and feedback on how to improve learning in my class.	67.1%	60.7%

- **Effective pedagogy** was highlighted by 168 students and 8 teachers, who pointed to instructional practices that fostered engagement and deeper understanding in their open-response. Students emphasized the value of coursework that felt relevant to their interests and allowed them to take pride in their learning. As one 8th grade student from Da Vinci Connect TK-8 explained:

"The hands-on project-based learning really helps me to understand what I'm learning and makes me want to share my knowledge with others. It also makes me very proud of my work. I even make Presentations of Learning about topics I learn about in homeschool because I love them so much. This learning style makes me able to ask questions in class during discussions, and I feel safe enough here to share my thoughts to everyone."

- **Strong relationships** were named by 74 students and 8 teachers as a key factor in student success, underscoring the relational foundation of these programs. As one student from Friendship Collegiate Online reflected:

*"It's easier to talk to people online, easier to connect—both with teachers and peers. And it doesn't change when I go in person, I've met my teachers in person—the connection is genuine."*⁵

4. The sizable increase in students selecting often or always on this variable in the Spring may be due to the prompt adding "either on my own" whereas in the fall, the prompt only asked about setting goals with a teacher.

5. Mathematica, as a part of their casual pathways analysis, conducted interviews and shared qualitative data to support our understanding of practices within each model.

Together, these perspectives show that beyond strong academic outcomes, students experience VHL models as environments where they are able to direct their own learning, engage in meaningful coursework, and build authentic relationships with teachers and peers.

Table 5. Teachers Indicating They Often or Always Facilitate the Quality Drivers of Virtual and Hybrid Instruction

Quality Driver	Survey Item	Percentage of Teachers who Indicated Often or Always	
		Fall (n=53)	Spring (n=31)
Foundation for Self-Directed Learning	I articulate clear expectations for virtual/hybrid learning to my students and their families.	98.1%	93.5%
	I clearly communicate with families in their preferred language so they can understand how to best support their child with their learning.	67.3%	62.1%
	I prioritize building relationships with my students.	92.5%	100%
	I support my students' social-emotional needs.	92.5%	100%
Effective Pedagogy	I integrate instructional strategies to foster active learning opportunities for my students.	94.2%	96.8%
	I provide ongoing and regular feedback to my students on how they can improve their learning.	86.8%	93.5%
	I provide actionable feedback through multiple modalities (i.e., text, audio, video).	69.2%	71.0%
Strong Relationships	I strive to scaffold collaborative activities to foster a sense of community in my classroom (among my students).	76.9%	77.4%

Models that Support the Whole Child

In addition to engaging in high-quality learning practices, students across all five models reported positive experiences with their schools and confidence in their own success (Table 4). The majority indicated that they *often* or *always* felt comfortable at school, respected by adults, a sense of belonging, and successful as learners.

These perceptions are particularly significant given that many students chose these models after becoming disengaged in traditional settings or because they needed an alternative pathway to meet their goals. The fact that students in virtual and hybrid programs report such high levels of comfort, belonging, and respect signals that these models are not only accelerating learning but also providing the holistic support necessary for every student to thrive.

Table 6. Students Often or Always Feel Positively About Their Learning Models

Site	I like to go to school.	I feel comfortable at school.	I feel respected by the adults in my school community.	I feel a sense of belonging in my school community. belonging in my school community.	I know how to connect with teachers when I have a question or need additional support.	I feel successful as a learner.
Bismarck Public Schools Empower[Ed] (n=58)	79.3%	79.3%	94.8%	79.3%	93.1%	81.0%
DaVinci Connect TK-8 (n=232)	68.3%	74.1%	84.7%	74.2%	75.3%	78.4%
Friendship Collegiate Online (n=107)	36.4%	68.2%	72.3%	50.9%	72.9%	58.5%
Novi Virtual (n=60)	71.9%	86.7%	84.7%	70.2%	83.3%	69.7%
St. Vrain AGILE (n=75)	63.0%	89.2%	89.3%	83.8%	85.1%	88.4%

*While some percentages may appear low, results for each survey item at each site skewed positively, with either the most or next most selected option being sometimes.

"By being a part of Novi Virtual, I have been able to grow as an individual in ways more than just content." - 12th Grade Novi Virtual Student

Too often, schools are framed in a false dichotomy: they can either be joyful or deliver rigorous instruction, but not both. Our findings challenge that assumption. **Taken together—academic outcomes, evidence of high-quality learning, and strong student belonging—show that public schools can do both, and do it well.** By looking across this constellation of outcomes, we see how these diverse models succeed. They tailor their design to the students they serve, build strong communities, and engage learners in relevant, connected experiences. The result is consistent out performance of comparable schools, paired with environments where students thrive.

"I think over the year they have really grown comfortable with their virtual environment. I have been able to watch (virtually) my students come out of their shells and share and collaborate with their peers who are in person. Watching this has been incredibly rewarding!" - St. Vrain AGILE

Implications for the Field

The findings from these five sites demonstrate that **innovation within public systems is not only possible, but essential** if we want students who are often furthest from opportunity to have access to high-quality learning. For too long, virtual and hybrid models have been treated as temporary fixes or peripheral options. Our research shows that, when designed thoughtfully, they can provide rigorous, equitable, and durable pathways for students whose needs may not be met by the traditional model of schooling.

Students across these diverse models show evidence of outperforming their peers and equitable growth rates on standardized measures—a promising sign that the models, when matched well to student needs, can support learning acceleration. This suggests that the question is not whether virtual or hybrid learning can work, but rather how well the right model fits the right student.

Equally important, these programs expand choice and access for families in contexts where the traditional model has come up short, and serve as models for innovating within public school systems:

- **Bismarck Public Schools Empower[Ed]** program engages juniors and seniors for whom traditional models of learning didn't feel relevant or inspiring, instead giving them agency to choose how they demonstrate mastery of content standards while engaging in projects aligned to both their interests and community needs.
- At **DaVinci Connect TK-8**, parents become co-educators, allowing for students and families to customize their learning experiences with the support of highly-trained certificated educators.
- **Friendship Collegiate Online** serves a high population of students with disabilities, students experiencing anxiety or medical challenges, and those with safety concerns, creating a safe place for students to engage in rigorous learning with the support of teachers and learning coaches.
- In **Novi Virtual**, the model keeps students engaged in learning when they would otherwise have to de-enroll due to extended travel or medical needs, while also re-engaging students from partner school districts facing chronic absenteeism or potential expulsion.
- In **St. Vrain's AGILE Program**, rural students gained access to advanced coursework that would be otherwise unavailable. The model allows for rural schools to maintain their student enrollment while expanding access to specialized courses, particularly for students identified as gifted.



Credit: Allison Shelley, EDUImages

These examples underscore that high-quality learning need not be dependent on geographic location nor bound by a single delivery model, but should instead be driven upon the needs of the students they serve.

The lesson for the field is clear: **public schools can deliver positive student outcomes when they are given the space to pilot, learn from evidence, and adapt in partnership with their communities.** Each of these models was developed through an intentional planning process that included community voice, alignment to local needs, and a commitment to continuous improvement.

Finally, these models demonstrate that learning acceleration happens in models with a strong instructional core. Regardless of format, students thrive when they experience effective pedagogy and strong relationships while building a foundation for self-directed learning. **Virtual and hybrid contexts are not exceptions—they are environments where these drivers can be realized in powerful ways, meeting the needs of students who are often deemed invisible.**

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Appendix A: Methodology

Purpose and Objectives

The overarching goal of this study⁶ was to build an evidence base around the efficacy of public VHL models to accelerate learning for K-12 students and understand their different recipes—when, where, why, and for whom they work. To accomplish this, we examined the contextual factors that explain how they accelerate learning for specific students within unique contexts.

Taking a treatment-theory approach,⁷ the aim of this study was to deeply understand the strategies and practices occurring within these models, by achieving the following:

- Identify common features or attributes that can be observed across high-quality VHL models;
- Develop more comprehensive definitions of “evidence” and “learning acceleration” based on the experiences of the selected models;
- Identify how learning acceleration happens in VHL models for different subsets of learners;
- Determine the key contextual factors that explain why models worked in particular contexts and for particular students; and
- Generate actionable and transferable learnings that others might adapt to their own VHL contexts.

Since the pandemic, learning acceleration is often narrowly defined by progress on English and math benchmarks. High-quality virtual and hybrid models take a broader view, expanding access to previously unavailable learning opportunities for students with varied needs. As such, our measurement of learning acceleration includes both traditional academic progress and broader measures to examine the degree to which students demonstrated learning or acquired expected skills and content.

Conceptual Framework

Effective engagement of the instructional core⁸ drives the quality of any learning experience, whether in person or online. With VHL models, this concept includes technology that supports students’ interaction with learning content, objectives, and tasks; pedagogy that encourages active engagement with rigorous content in support of mastery; and relationships—both to others as well as to the task—that strengthen commitment to and motivation for learning.⁹ While these three factors of technology, pedagogy, and relationships work interdependently, they also build on each other serially. For example, technology supports effective engagement during instruction if designed based on sound pedagogical principles (Figure 1).

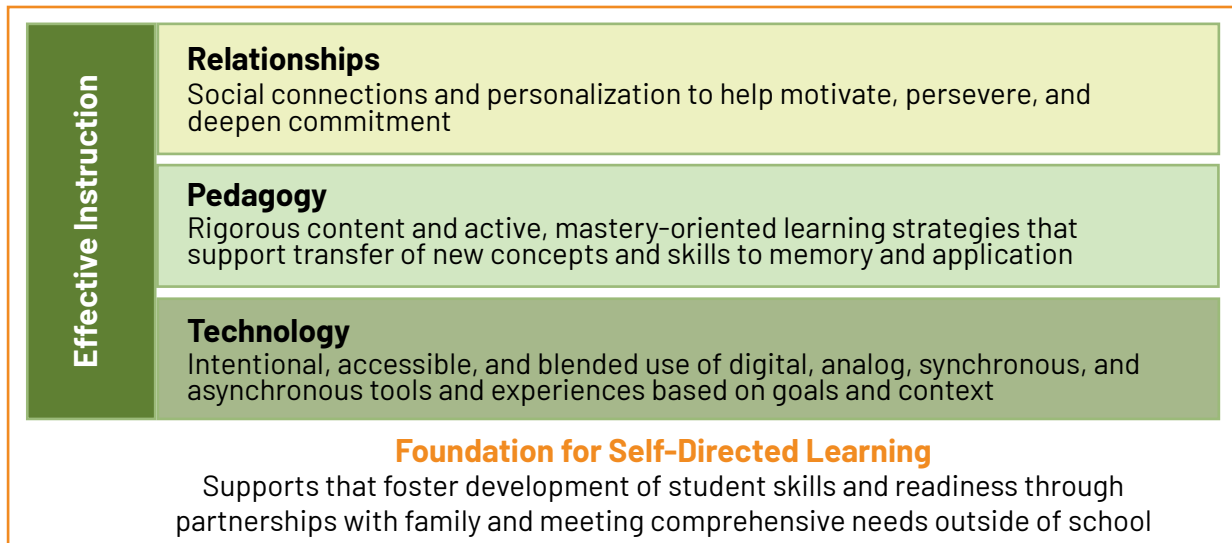
6. Creswell & Plano Clark, 2017

7. Leviton & Lipsey, 2007

8. Elmore, 2008

9. Rabbitt, 2020

Figure A1. Conceptual Framework – Key Factors that Drive Quality Virtual and Hybrid Learning



Core to this framework lies the need for students to possess a solid foundation to learn independently¹⁰ and exert self-direction.¹¹ This involves both helping the student to build core skills as well as supporting their families and community. As such, high-quality VHL approaches prioritize building these skills and relationships.¹²

Modes of Inquiry

The study employed a concurrent mixed-methods research design, reviewed and approved by an institutional review board, collecting and analyzing quantitative and qualitative data simultaneously.¹³ The study started with a national landscape analysis to identify the study sample, followed by a mixed-methods studies of five high-quality public VHL models to ultimately answer four, overarching research questions:

- **RQ1a:** Has learning acceleration occurred among learners exposed to virtual and hybrid models in the selected sites over time?
- **RQ1b:** In what ways, and to what extent, do these models affect student outcomes for specific populations of students (e.g., Multilingual Learners, students receiving special education services, students from rural or low-income communities)?
- **RQ2:** What common features or attributes could be observed as common across high-quality virtual or hybrid models?
- **RQ3:** What role did high quality virtual learning play in contributing to learning acceleration in different subsets of learners vis-a-vis other factors?
- **RQ4a:** What were the challenges and successes associated with implementation?
- **RQ4b:** How, why and under what conditions have virtual and hybrid models contributed to observed changes in learning acceleration among subsets of students within the 5 systems?
- **RQ5:** What are the contextual factors and other conditions that help explain why these models better contributed to learning acceleration in some contexts compared to

10. Johnson & Galy, 2013; Shyu & Brown, 1992; Stansfield, McLellan, & Connolly, 2004

11. Stansfield, McLellan, & Connolly, 2004

12. Rabbitt, 2020

13. Creswell & Plano Clark, 2017

Purposive Sampling Strategy

In order to identify a purposive sample of high-quality VHL models, we conducted a landscape scan of 64 public VHL models. These models were sourced from partners, the 2024 National Educational Technology Plan, and the Virtual Learning Leadership Alliance. Then, we categorized these models based on where they operated (at the state-, system-, or school-level), their intention (i.e., fully virtual, hybrid, part-time course access), the types of available instruction, and evidence of student success. After understanding the landscape of VHL in the U.S., we conducted unstructured interviews with a purposive sample of nine leaders to better understand their available data, the students they serve, and the practices that they associate with their success followed by seven structured interviews to narrow the sample to five models (Table 1).

Table A1. Five Virtual and Hybrid Models

Full Virtual		
Friendship Collegiate Online ● Configuration: Charter ● # of Students: 232 ● Grades: Grades K-12 ● Location: Washington, D.C. ● Model: Full-time virtual school and supplemental course provider to partner schools. ● Demonstrated Success: As a fully online school operating well-before the pandemic, this school has seen significant student success with recognition both locally and nationally.	Novi Virtual ● Configuration: District Program ● # of Students: 215 ● Grades: Grades K-12 ● Location: Novi, MI ● Model: Full and part-time virtual program with course access options for partner districts. ● Demonstrated Success: This program has demonstrated high student outcomes and is adapting to serve students previously disengaged by traditional models.	
Hybrid		
Bismarck Public Schools Empower[Ed] ● Configuration: District Program ● # of Students: 100 ● Grades: Grades 11-12 ● Location: Bismark, ND ● Model: Hybrid program for 11th and 12th grade students focused on core subject areas through student interests and passions. ● Demonstrated Success: The program has received national attention for their innovative model to engage students in interest-based, credit-bearing learning. During the 2024-25 school year, they will be expanding to an additional high school.	DaVinci Connect TK-8 ● Configuration: Charter School ● # of Students: 530 ● Grades: Grades TK-8 ● Location: Hawthorne, CA ● Model: Hybrid, ungraded program focused on real-world learning at home three days a week and in person classes two days a week. ● Demonstrated Success: As a hybrid home-school model, this school has significant enrollment demand from families who want more agency and community in their child’s learning. In 2023, they received a state award for narrowing the achievement gap and producing high student outcomes.	St. Vrain Valley Schools’ AGILE Program ● Configuration: District Program ● # of Students: 780 ● Grades: Grades 7-12 ● Location: Longmont, CO and rural districts throughout CO ● Model: Offers course access where students attend their home school and engage in hybrid learning with a virtual class. ● Demonstrated Success: Students who have participated in the program outperform their peers on standardized assessments, have a 94% graduation rate, and a 0.6% drop out rate.

Methodology

This mixed-methods study sought to understand common features of high-quality VHL models and how they accelerate learning by not only studying across the sites, but by engaging in nested studies of each. To accomplish this, the research team and site leaders co-designed research studies for the 2024-25 school year and, in partnership with Mathematica, built site-specific theory of change models. These theories of change informed the larger data collection strategy and served as the roadmap for our study.

Each model takes a unique approach to learning, requiring different constellations of measures to help us understand their success (Table 2). The data collected from each site included a combination of academic data (e.g., NWEA MAP scores, state assessments, grades, etc.), broader measures (attendance, career dispositions, credits earned, etc.), and demographic information to support analyses of differential impacts across student subgroups. In order to have measures that spanned across sites, as well as to understand the presence of factors associated with high-quality learning (Figure 1), we designed fall and spring surveys for students and teachers. These surveys included Likert-scale items to gather perception data on the frequency that high-quality drivers were experienced, as well as open-response items to better understand what students and educators felt led to learner success. All data was able to be linked to the individual student level to support a deeper understanding of how each model worked and for whom.

Table A2. Data Collection from the Five Sites

	Novi Virtual	Friendship Collegiate Online	Bismarck Public Schools Empower[Ed]	DaVinci Connect TK-8	St. Vrain Valley Schools' AGILE Program
Fall and Spring Surveys	X	X	X	X	X
Student Demographics	X	X	X	X	X
Attendance	X	X	X	X	X
GPA	X	X	X		X
Grades	X		X		X
Standards Progression			X		
NWEA MAP		X		X	
State Assessments				X	
PSAT/SAT/ACT		X			X
Career Dispositions			X		
Credits Earned		X	X		X

Quantitative Analysis

The first layer of quantitative analysis, across all data sets, included the use of descriptive statistics. Frequency analyses and analysis of skewness, kurtosis, distribution, and normality supported an initial understanding of the data set and were used to determine appropriate subsequent tests that would identify relationships between variables, consistent with best practices for exploratory data analysis in educational research.¹⁴ Given that the data did not meet assumptions of normality, nonparametric tests were employed to preserve the validity of statistical inferences.¹⁵

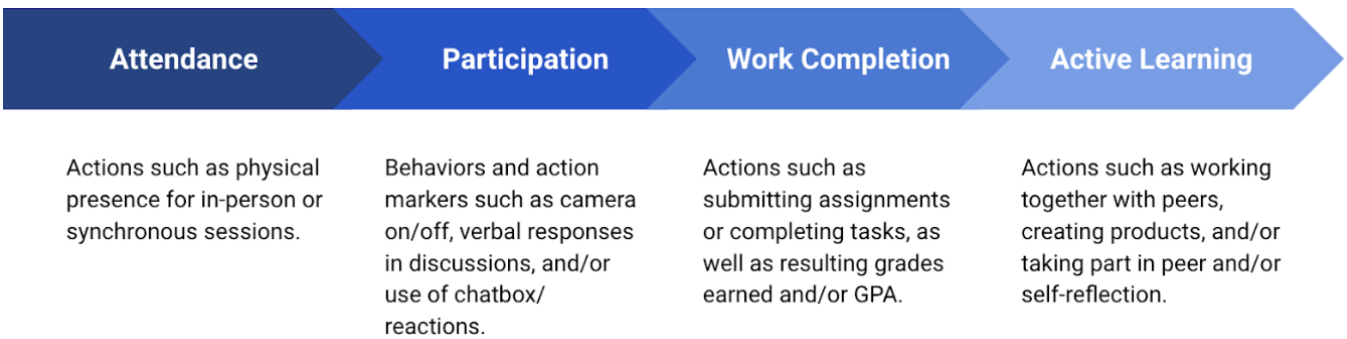
To examine bivariate associations, Spearman’s rank-order correlation was used, which is well-suited for non-normally distributed data.¹⁶ For variables with statistically significant relationships, the Kruskal–Wallis test was conducted to assess differences between groups, followed by the Dwass–Steel–Critchlow–Fligner (DSCF) test for post-hoc pairwise comparisons. This combination of tests provides a robust, distribution-free approach to group comparison and effect size estimation.¹⁷

Qualitative Analysis

To analyze the qualitative data gathered from the individual theory of change sessions with site leaders, a holistic coding process¹⁸ captured and documented categories and themes. The initial analysis identified emergent codes which was followed by two rounds of analyses that used two levels of hypothesized deductive codes aligned to existing frameworks.¹⁹ In each round, additional emergent themes were noted, codes were added as needed, and various codes were refined or removed. Once each layer of codes was identified, a matrix database was developed (Appendix C).

Analysis of open-response survey data was done using a multi-level coding process that integrated both inductive and deductive strategies.²⁰ In the initial coding cycle, emergent codes were developed to capture participants’ descriptions of variables influencing student success. A second cycle of coding identified directionality and nuance within these codes, facilitating deeper thematic exploration.²¹ In the final round, a theory-driven, deductive approach was used to align emergent patterns with an established Student Engagement Continuum framework (Figure 3).²²

Figure A3. Continuum of engagement from foundational tenets to more meaningful learning



14. Tabachnick & Fidell, 2013
15. Gibbons & Chakraborti, 2011
16. Siegel & Castellan, 1988
17. Critchlow & Fligner, 1991; Linton & Harder, 2007
18. Miles, Huberman, & Saldāna, 2018
19. Rabbitt, 2020; The Learning Accelerator, 2021
20. Miles et al., 2018
21. Saldaña, 2021
22. Atkinson & Holland, 2023

Appendix B: Structured Interview Protocol

Introduction

- Thank you for taking the time to come talk with us today. We are excited to learn more about **[site name]** and really appreciate your participation.
- This discussion will last approximately 30 minutes.
- As we mentioned in our initial conversation, a critical need exists to create an evidence base based around the different ways that virtual and hybrid learning can drive student learning outcomes such that we can shift the national narrative. Through this project, we intend to close the gaps in the current research base and produce rigorous evidence of how different virtual approaches to driving learning acceleration may be working, for whom, and under which conditions.
- With our research partner, we intend to explore the following questions:
 - In what ways, and to what extent, do these models affect student outcomes for specific populations of students (e.g., English Learners, students receiving special education services, students from rural or low-income communities)?
 - How do virtual and hybrid models contribute to student learning acceleration? For whom and under what conditions?
 - What common features or attributes could be observed as common across high-quality virtual or hybrid models?
 - What are the contextual factors and other conditions that help explain why these models function better in some contexts than others?
 - What were the challenges and successes associated with implementation?
 - In what ways could these models be adapted in similar and different school contexts?
- Are there any questions before we get started?

Interview Questions

1. How would you describe your instructional model?
 -
2. How does the program provide targeted opportunities to meet the learning needs and interests of your students?
 -
3. How would you describe the characteristics of the students who enroll in your program (demographics, learning needs, special interests, etc.)?
 -

4. How do you define “success” for your students in terms of learning outcomes? What do you point to as the best indicator of that success?

-

5. In what ways do you assess student learning acceleration? How are students performing against these measures? How are students performing according to those indicators (i.e., what do they tell you about learning acceleration)?

-

Appendix C: Workshop Materials

Workshop #1

- Welcome & Overview (5-10 minutes)
 - Introductions
 - Purpose of the collaborative workshop sessions
 - Discussion of the goals of the project
 - Overview of the 18-month, phase 2 roadmap
- Evaluation Planning and Theory of Change (ToC) Objectives (5 minutes)
 - Build a shared understanding of the Purpose and Objectives for the VHL Evidence Project.
 - Better understand how strategies and practices accelerate learning.
 - Surface your questions to ensure that our learning together is meaningful.
 - Identify the data sources that will allow us to answer our research questions.
 - Create a design to serve as the foundation for our work together.
- Purpose and Objectives (5 minutes)
 - Participants review the purpose and objectives for phase two of the study
 - Participants then brainstorm their purpose and objectives for what they hope to learn by participating
- Introduction to the Conceptual Framework and ToC Process (5 minutes)
 - Introduction to the conceptual framework for high-quality VHL models
 - Initial discussion of the purpose behind creating a ToC
- Guided activity to identify elements of the ToC (60 minutes)
- Describe the students & school community
- Identify and categorize core components of the program culture
- Explain the instructional experience
- Map the broader learning ecosystem
- Final Reflection and Questions (5 minutes)

Workshop #2

- Welcome & Overview (5-10 minutes)
- Reminder of the Evaluation Planning and Theory of Change (ToC) Objectives (5 minutes)
- Revisit & Refine the Purpose & Objectives (10 minutes)

- ToC Development (60 minutes)
 - The research team drafted a ToC based on what was shared during the first workshop. The structure reads: "If [site] implements these strategies and practices well (blue column) then learners will be (green column) and will achieve (gray column)"
 - Participants then clarified, asked questions, and added insights to refine the model
- Final Reflection and Questions (5 minutes)

Appendix D: Surveys

Participating teachers and students will be asked to complete a short pre- and post-survey.

Teacher Fall Survey

Welcome Message

Hello,

We are asking that you please complete a short survey about your experience teaching in the [site]. The goal of this survey is to better understand what you may be doing to create a high-quality learning experience for your students.

This survey should take you approximately 5-10 minutes to complete.

Participation in this survey is voluntary. Your responses will be kept confidential. Any published data will be in aggregate and will not identify any individual.

If you have any questions, you can ask [insert name of person in your school/district]. Your perspective and experience are very important to us.

Survey Items

Frequency Scale (*Not at all, Rarely, Sometimes, Often, Always, I'm Unsure*)

- I articulate clear expectations for virtual/hybrid learning to my students and their families.
- I clearly communicate with families in their preferred language so they can understand how to best support their child with their learning.
- I prioritize building relationships with my students.
- I support my students' social-emotional needs.
- I integrate instructional strategies to foster active learning opportunities for my students.
- I provide ongoing and regular feedback to my students on how they can improve their learning.
- I provide actionable feedback through multiple modalities (i.e., text, audio, video).
- I strive to scaffold collaborative activities to foster a sense of community in my classroom (amongst my students).

Confidence Scale (*Very Unconfident, Somewhat Unconfident, Somewhat Confident, Very Confident, I'm Unsure*)

- I have adequate training on how to use all of the features/functions of technology tools, course materials, and supports.
- I know how to leverage both asynchronous and synchronous learning experiences to meet the varied needs of my students.
- I know how to leverage different modalities (i.e., text, audio, video) to meet specific student needs.
- I am able to produce/create multimedia resources to support learner engagement.
- I am able to build personal relationships with my students via synchronous and asynchronous tools.

- I understand how to support my students' social and emotional needs in a virtual environment.
- I am able to contribute to the design of our virtual/hybrid model.

Consider the practices below and indicate the frequency with which you use them in your instruction: *Never, Sometimes, Often, All the Time, I'm Not Sure*

- When students express curiosity about a problem, I encourage them to explore it in detail.
- I praise students for combining ideas in ways other people have not tried.
- My learning activities require students to explain interconnected concepts to others.
- I ask students to articulate new ideas.
- My class assignments require students to generate new solutions to problems.
- My instructional routines include having students engage in problem-solving before asking me.
- I create opportunities for students to imagine things that do not exist in the real world.
- I expose students to content outside the area I teach.
- I model how to find the materials needed to develop an idea.
- I model how to find a solution with other available resources if a certain resource is not available.

For the following questions, please indicate your level of agreement: *Strongly Disagree, Disagree, Agree, Strongly Agree, I'm Not Sure*

- Students should have opportunities to learn in unconventional ways.
- Students should define appropriately challenging learning outcomes for themselves.
- Students should understand a difficult problem before solving it.
- Students should have opportunities to engage in creative problem-solving.
- Students should find the connection between a problem and real-world applications.
- Students must examine problems in different ways.
- Students need to imagine alternative solutions to a problem.

Open Response: Why do you think that your students are, or are not, succeeding in your [virtual/hybrid] class?

Student Fall Survey

Welcome Message

Hello,

We are asking for your help by completing a short survey about your experiences in [site].

This survey should take you 10-15 minutes to complete and includes questions about your learning experiences, use of technology, and connections to your classmates and teachers.

Participation in this survey is voluntary and anonymous. You do not have to complete it, and no one will know your answers.

If you have any questions, you can ask your teacher for additional information.

Survey Items

- Frequency Scale (*Not at all, Rarely, Sometimes, Often, Always, I'm Unsure*)
- I understand the expectations for learning in this course.
- My teacher cares about my learning needs, especially when I am having a bad day.
- I can access content using text, audio, and video.
- I feel connected to what we are learning in class.
- In this class, I have opportunities to learn with my peers through activities such as creating projects, small-group discussions, or building models.
- I take part in activities that meet my needs to improve areas of my learning.
- I receive immediate feedback from my teacher that helps me improve my learning.
- I work with my teacher to set personal goals.
- I am able to make choices in my learning such as when and how I want to learn or the tools that I use.
- I am able to provide suggestions and feedback on how to improve learning in my class.

Please indicate how often you do each of the things written in the statements below: *Never, Sometimes, I'm Not Sure, Often, All the Time*

- I like to look at problems from different angles (perspectives).
- When I express curiosity about a problem, my teacher encourages me to learn more about it.
- My teacher praises me for combining ideas in ways others haven't tried.
- My teacher shows me how to find a solution with other available resources if a certain resource is not available.

Please indicate how often you do each of the things written in the statements below: *Never, Sometimes, I'm Not Sure, Often, All the Time*

- My teacher allows me to show my creativity in my classwork.
- My teacher rewards me for showing my ideas in a variety of forms.
- My teacher praises me when I carefully select media that demonstrate what I know.
- I like to show new ideas through various digital media.
- My teacher allows me to create things that are important to me.
- My classwork allows me to create new products or projects.

Open Response: When you think about your [virtual/hybrid] learning, what do you think best supports you as a learner?

Teacher Spring Survey

Welcome Message

Hello,

We are asking that you please complete a short survey about your experience teaching in the

[site]. The goal of this survey is to better understand what you may be doing to create a high-quality learning experience for your students.

This survey should take you approximately 5–10 minutes to complete.

Participation in this survey is voluntary. Your responses will be kept confidential. Any published data will be in aggregate and will not identify any individual.

If you have any questions, you can ask [insert name of person in your school/district]. Your perspective and experience are very important to us.

Survey Items

Frequency Scale (*Not at all, Rarely, Sometimes, Often, Always, I'm Unsure*)

- I articulate clear expectations for virtual/hybrid learning to my students and their families.
- I clearly communicate with families in their preferred language so they can understand how to best support their child with their learning.
- I prioritize building relationships with my students.
- I support my students' social-emotional needs.
- I integrate instructional strategies to foster active learning opportunities for my students.
- I provide ongoing and regular feedback to my students on how they can improve their learning.
- I provide actionable feedback through multiple modalities (i.e., text, audio, video).
- I strive to scaffold collaborative activities to foster a sense of community in my classroom (among my students).
- I believe my students enjoy the learning that they do in our virtual/hybrid school.
- I believe my students feel comfortable in our virtual/hybrid school.
- I believe my students feel responsible for their own learning.
- I believe my students feel equipped to access the resources, tools, and people that they need to be successful.
- I believe my students feel supported in their learning by the adults in their lives.
- I believe my students see the value in what they are learning and believe that their learning is relevant to their future goals.
- I consider my students' home educator/learning coach as a partner in achieving student success. (if applicable)

Confidence Scale (*Very Unconfident, Somewhat Unconfident, Somewhat Confident, Very Confident, I'm Unsure*)

- I have adequate training on how to use all of the features/functions of technology tools, course materials, and supports.
- I know how to leverage different modalities or instructional strategies to meet specific student needs.
- I am able to produce/create multimedia resources to support learner engagement.
- I am able to contribute to the design of our virtual/hybrid model.

Consider the practices below and indicate the frequency with which you use them in your instruction: *Never, Sometimes, Often, All the Time, I'm Not Sure*

- When students express curiosity about a problem, I encourage them to explore it in detail.
- I praise students for combining ideas in ways other people have not tried.
- My learning activities require students to explain interconnected concepts to others.
- My class assignments require students to generate new solutions to problems.
- I model how to find a solution with other available resources if a certain resource is not available.
- I purposefully create opportunities for students to collaborate with their peers.
- I integrate instructional strategies that foster a sense of community in my classroom.
- I speak with families about how to support their student with virtual learning.
- I touch base with my students' home educator or learning coach to discuss my students' learning. (if applicable)

Open Response:

- In what ways do you think your students have changed since being enrolled in a virtual or hybrid class/program?

Student Spring Survey

Welcome Message

Hello,

We are asking for your help by completing a short survey about your experiences in [site].

This survey should take you 10-15 minutes to complete and includes questions about your learning experiences, use of technology, and connections to your classmates and teachers.

Participation in this survey is voluntary and anonymous. You do not have to complete it, and no one will know your answers.

If you have any questions, you can ask your teacher for additional information.

Survey Items

Frequency Scale (*Not at all, Rarely, Sometimes, Often, Always, I'm Unsure*)

- I know what is expected of me to be successful in the [model].
- I feel connected to what we are learning in class.
- I take part in activities that meet my needs and help me to learn.
- I set goals for my learning, either on my own or with the help of a teacher.
- I am able to provide suggestions and feedback on how to improve learning in my class.
- My teachers have taken the time to get to know me as a person.
- I have support at home to achieve my learning goals.
- I know how to manage my time effectively to achieve my learning goals.
- My teacher provides clear and helpful feedback.

Frequency Scale (*Not at all, Rarely, Sometimes, Often, Always, I'm Unsure*)

- I like to go to school.

- I feel comfortable at school.
- I feel respected by the adults in my school community.
- I feel a sense of belonging in my school community.
- I know how to connect with teachers when I have a question or need additional support.
- I feel supported by my classmates.
- I enjoy working on projects with other students.
- I feel successful as a learner.
- I am motivated to learn even when the work is challenging.

Please indicate how often you do each of the things written in the statements below: *Never, Sometimes, I'm Not Sure, Often, All the Time*

- I can look at problems from different angles (perspectives).
- When I express curiosity about a problem, my teacher encourages me to learn more about it.
- My teacher encourages me to combine ideas in ways others haven't tried.
- My teacher assists me in finding solutions using the resources available to me.
- My teacher allows me to show my creativity in my classwork.
- I am able to make choices about what I learn.
- I am able to make choices about when I learn.
- I am able to make choices about how I show my learning.
- I am able to learn in spaces that fit my needs and/or limit distractions while I'm learning.

Open Response:

In what ways has being a part of the program/school changed how you learn?

Appendix E: Bismarck Public Schools Empower[Ed]

Model Snapshot: Bismarck Public Schools Empower[Ed] - Bismarck, North Dakota

Empower[Ed] is a competency-based, hybrid model created for students who felt traditional high school was not working for them. For example, students who struggled to find relevance in their core subjects or lacked strong relationships with educators. The Empower[Ed] program re-engages learners by having them master core academic standards through interest-driven projects, many of which are developed in partnership with, or in service to, the local community.

Key Findings:

- **Student outcomes:** Empower[Ed] students outperformed peers on GPA, credit attainment, attendance, and being on track to graduate, signaling that this model provides an effective option for students who may otherwise be disengaged from traditional learning. Analysis also revealed that Empower[Ed] students demonstrated mastery of content standards at an accelerated pace, moving from partial to near-total mastery across content areas in less than one academic year.
- **Equity impact:** The program advances gender equity in CTE pathways while sustaining rigorous academic results.
- **Skills that matter:** Career Readiness Practices (CRPs) were strongly correlated with academic outcomes. Statistical analyses revealed strong associations between CRPs and traditional outcomes for Empower[Ed] students:
 - **Responsible Employee (HS.01) and Problem Solving (HS.08)** scores correlated significantly with GPA ($\rho = 0.42\text{--}0.49$, $p < .01$).
 - **Time Management (HS.01.06)** correlated with both GPA ($\rho = 0.44$, $p < .001$) and credit accumulation ($\rho = 0.35$, $p < .01$).
 - **Using Resources to Complete Work (HS.02.06)** showed one of the strongest correlations with GPA ($\rho = 0.65$, $p < .001$).
- **Student experience:** On fall and spring surveys, students reported that they perceived Empower[Ed] to be a high-quality model, describing effective pedagogy, strong relationships, and opportunities for self-directed learning as part of their experience.

Bismarck Public Schools Empower[Ed] is a **hybrid** program for 11th and 12th grade students who engage in personalized, standards-based learning centered on their personal interests and career goals through both core academic subjects and independent study. Students can choose to take any or all of their core courses (ELA, math, science, and social studies) through Empower[Ed]. Working with their teacher, they customize their learning by mapping content standards to projects centered on their interests and passions. These flexible, project-based pathways for learning encourage students to take ownership of their education while receiving guidance from their teachers to ensure they meet their goals.

Table E1. Student Demographics of Empower[Ed], Legacy High School, and Bismarck Public Schools for School Year 2024–2025

Demographics	Empower[Ed] (n=58)	Legacy High School (n=1,471)	Bismarck Public Schools (n=14,086)
Black or African American	1.7%	6.1%	5%
White	96.6%	79.5%	75%
American Indian	1.7%	7.9%	11%
Female	48.3%	49.5%	Not Reported
Male	51.7%	50.5%	Not Reported
Qualifies for Nutrition Support	13.8%	23.8%	22%
Qualifies for Special Education Services	6.9%	12.7%	15%

Model Practices

To understand and evaluate the practices within the Empower[Ed] model, we used [the quality drivers of virtual and hybrid learning](#)—effective pedagogy, strong relationships, foundation for self-directed learning, and technology—as the underlying theoretical framework. **The Empower[Ed] model is designed for students that did not see relevance in traditional core subjects, did not have strong relationships with educators, or felt that traditional school wasn’t for them.**

“Before Empower[Ed], I’d walk into class every day not knowing what I was doing. Now I come in with a goal— and a reason to care.” – Empower[Ed] 11th Grader

By serving this unique population of learners, it is able to engage (or re-engage) students. First, students experience a Disorientation, a set of modules that teach them how to drive their own learning. Educators then support learners with one-on-one guidance for mapping their content standards to projects of interest, customizing learning to be deeply relevant and aligned to their goals. Students have choice in the pace and sequencing of their learning and can demonstrate their growth towards standards through 1:1 oral assessments. This approach not only builds student investment and engagement, but also creates pathways for students to deeply engage within their communities. [Student projects](#) are often completed in service of or alongside community partners. These practices move students away from merely attending school to actively learning.

Figure E1. BPS Empower[Ed] Logic Model of Learning Acceleration

Inputs	Practices	Outputs	Outcomes
11th and 12th graders from the Career Technical Academy and Legacy High School who choose to take their core content courses in a hybrid learning environment that makes learning relevant to their personal goals	Effective Pedagogy ● Earn course credits through standards-based learning, focusing on mastery rather than seat time. ● Complete community-driven passion projects in core content areas that build relevance and social capital for students. Strong Relationships ● 1:1 feedback and educator support to ensure every learner finds success. Foundation for Self-Directed Learning ● Map content standards to their projects and monitor their progress to drive their own learning. ● Participate in Disorientation, a series of modules at the start of their enrollment, to learn how to lead their own learning. Technology ● Technology allows students to connect with experts, conduct research, and track their learning. ● Students engage with industry standard technology to support CTE learning.	Engagement ↓ Attendance ↓ Participation ↓ Work Completion ★ Active Learning	Traditional Measures ● Standards Progressions ● GPA ● Credits Earned ● On Track to Graduate Broader Measures ● Attendance ● College and Career Readiness Practices

Data Collection and Analysis

During the 2024-2025 school year, FullScale administered a fall and spring survey for students and teachers to understand the extent to which the high-quality drivers of virtual and hybrid learning were present. Empower[Ed] provided student-level data for enrolled students, including demographic information, standards progressions by course, GPA, credits earned, on track to graduate status, attendance, and college and career readiness practice scores. In addition, this analysis also included aggregate data from Legacy High School to support contextualization of student performance.

The FullScale research team de-identified all of the data and then analyzed it using descriptive statistics. Analyses of skewness, kurtosis, distribution, and normality supported an initial understanding of the data and were used to determine appropriate subsequent tests that would identify relationships between variables. This approach is consistent with best practices for exploratory data analysis in educational research (Tabachnick & Fidell, 2013). Given that the data did not meet assumptions of normality, nonparametric tests were utilized to preserve the validity of statistical inferences (Gibbons & Chakraborti, 2011).

To examine bivariate associations, Spearman's rank-order correlation was used, which is well-suited for non-normally distributed data (Siegel & Castellan, 1988). For variables with statistically significant relationships, the Kruskal-Wallis test was conducted to assess differences between groups, followed by the Dwass-Steel-Critchlow-Fligner (DSCF) test for post-hoc pairwise comparisons.

Evidence of Learning Acceleration

Empower[Ed] tracks standards progressions, college and career readiness practices (CRPs), grades, GPA, and attendance. In order to understand learning acceleration in this context, we looked at how students progressed throughout the school year across these variables, how CRPs interacted with academic variables, and contextualized this data with students who attend a traditional high school in the system.

Traditional Academic Outcomes

Students who attend Empower[Ed] come from all three of Bismarck Public School's high schools, including 14 from Bismarck High School, 16 from Century High School, 27 from Legacy High School, and one student from outside the Bismarck Public School system. In order to contextualize how students in Empower[Ed] were performing, we compared their academic data with students who attend Legacy High School, a high performing traditional high school within the district.

With this contextual comparison, we found that students who attend Empower[Ed] on average performed better in GPA, credit attainment, attendance, and being on track to graduate, signaling this model provides an effective option for students who may otherwise be disengaged from traditional learning models.

Standards Mastery as Evidence of Learning Acceleration

As a competency-based program, Empower[Ed] tracks mastery of power standards over time. Students work with their teachers to choose the standards they will master for each course, maintain a spreadsheet to track their progress, and complete one-on-one oral assessments with their content teachers to demonstrate mastery and receive feedback on their learning.

Table E2. Comparison of Academic Outcomes

Outcomes	BPS Empower[Ed]	Legacy High School
GPA	3.24 (n=58)	3.1 (n=1,471)
On Track to Graduate	98.2% (n=57)	82.6% (n=1,215)
Attendance Rate	95.4% (n=58)	93.4% (n=1,471)
Total Credits Earned	6.56 (n=58)	6.1 (n=1,471)

Standards Mastery as Evidence of Learning Acceleration

As a competency-based program, Empower[Ed] tracks mastery of power standards over time. Students work with their teachers to choose the standards they will master for each course, maintain a spreadsheet to track their progress, and complete one-on-one oral assessments with their content teachers to demonstrate mastery and receive feedback on their learning.

First semester results showed modest standards progression for full year courses, but by year's end, students achieved nearly full mastery in their major subject courses. **An important feature of Empower[Ed] is that learning is not limited to semester time constraints, with students completing standards for first semester courses throughout the second semester, since mastery can take time.** This learning acceleration, moving from partial to near-total mastery in less than one academic year, demonstrates the effectiveness of Empower[Ed] in helping students rapidly progress toward academic standards.

Some students even accelerate their learning by beginning work on course standards before the semester begins. As a result, Empower[Ed] provides evidence that learning should not be limited to seat time, but rather should expand and contract to support students in demonstrating mastery of the standards and pursuing learning that will support their attainment of knowledge and skills that will aid them outside of their secondary education. As Pat Phillips, the CTE Director, shares, "Seat time tracks presence. We track purpose."

"In Empower[Ed], I would say [students] actually have to interact with the standards themselves. It's not the teacher saying, 'This is what you're meeting today, this is what we're learning.' They get to choose that, or they get to interact with it. And then they're in charge of their own assessments, too... The teacher's not giving them a quiz [and] saying, 'Okay, if you pass this quiz, you're proficient in the standard.' They have to assess on their own... They have to know what the standard is and how to become proficient in that standard. So I would say that that's one of the really big differences in students [who are in Empower[Ed]]. They realize, 'Oh, I actually know what I'm learning, which standards I'm hitting.' So that's been really cool for the students—they taking ownership of their learning. They're not just sitting and waiting for the teacher to tell them what to do." – Empower[Ed] teacher in an interview with Mathematica

Table E3. Standards Mastery by Course

Course Name	Semester One Average Standards Mastered	Semester Two Average Standards Mastered
Empower[Ed] Economics**	70% (n=2)	100% (n=34)
Empower[Ed] English 11	27.9% (n=12)	100% (n=12)
Empower[Ed] English 12	29.5% (n=22)	100% (n=23)
Empower[Ed] Integrated Science	10.7% (n=3)	97.7% (n=7)
Empower[Ed] Government*	98.9% (n=37)	100% (n=1)
Empower[Ed] Integrated Math III*	100% (n=12)	Not Applicable
Empower[Ed] Marketing I*	90% (n=6)	92.5% (n=4)
Empower[Ed] Sports and Entertainment Mktg*	100% (n=1)	100% (n=2)
Empower[Ed] US History 1914 and 1945	36.7% (n=9)	100% (n=10)

*Denotes a one semester course that allows for students to master standards over the course of the full year.

**Denotes a one semester course where students began working on standards prior to the semester the course was scheduled.

To understand student learning based on mastery of standards, the district provided an export from PowerSchool, their student information system. Our analysis revealed that the original export from PowerSchool provided inaccurate data on student progressions for some courses. In the case of core content courses, such as English, students are expected to master a designated set of power standards which are universally tracked in PowerSchool. However, for non-core courses, students often have one to three required standards they must meet in addition to a set of standards from which they choose. Despite all students meeting the same number of standards, Powerschool does not account for this variability and will under-report standards mastery for students. To address this technical glitch, Empower[Ed] students maintain individualized standards trackers that teachers use to manually update PowerSchool at the end of the year though that progress is not reflected in the data exports.

College and Career Readiness Practices (CRPs)

In addition to academic performance, Empower[Ed] assesses career-ready skills such as time management, problem-solving, teamwork, and communication. Similar to durable skills, these competencies are frequently featured in job descriptions across industries.²³ Statistical analyses revealed strong associations between CRPs and traditional outcomes for Empower[Ed] students:

- **Responsible Employee (HS.01)** and **Problem Solving (HS.08)** scores correlated significantly with GPA ($\rho = 0.42\text{--}0.49$, $p < .01$).
- **Time Management (HS.01.06)** correlated with both GPA ($\rho = 0.44$, $p < .001$) and credit accumulation ($\rho = 0.35$, $p < .01$).
- **Using Resources to Complete Work (HS.02.06)** showed one of the strongest correlations with GPA ($\rho = 0.65$, $p < .001$).

These results underscore that CRPs are not peripheral skills; they are statistically correlated with higher grades and greater credit accumulation, signaling that Empower[Ed] accelerates both academic outcomes but also builds durable skills tied to post-secondary readiness. Table 4 on the following page shows the statistical relationships between CRPs and traditional academic outcomes using Spearman's rho—a nonparametric alternative to Pearson's correlation. Since we had small sample sizes, and that the data was not normally distributed, this was a more appropriate statistical test to understand relationships.

Perhaps more powerfully, is the connection these CRPs have to real-world experiences students engage in during their time with Empower[Ed]. As one community member shared in an interview with Mathematica, *"We've brought them into an environment where they're like, 'Hey, this is cool. This is going to be hands on. I get to drive the bus as the student...And yes, there's a teacher sitting in the bus, but they're merely there to guide me.' [Students are] learning communication skills. They're learning, even math. They're learning how to map out projects. They're learning how to do physical work. They're learning how to work together."*

"Empower[Ed] is not just [about] producing a product. But it's [about] learning how to work with people effectively and productively...[time management is] absolutely part of it...[and] learning how to work with people is an invaluable skill, no matter what profession or trade you go into. It's just a human skill."—Empower[Ed] parent in an interview with Mathematica

23. America Succeeds, 2021

Table E4. Spearman's Correlation of Student Outcomes and Career Readiness Practices (CRPs)

		CRP (HS.01): Responsible Employee	CRP (HS.01.06): Time Manage- ment in Work	CRP (HS.01.08): Responsi- -bility	CRP (HS.02): Technical Skills	CRP (HS.02.05): Problem Solving and Critical Thinking	CRP (HS.02.06): Using Resources to Complete Work	CRP (HS.04): Communi- -cation	CRP (HS.04.05): Listening Well	CRP (HS.08): Problem Solving	CRP (HS.12): Teamwork	CRP (HS.12.01): Engaging Actively and Respectfully
BOY GPA	Spearman's rho	0.444***	0.424**	0.244	0.595***	0.351*	0.646***	0.173	0.296	0.420**	0.464***	0.456***
	df	55	55	41	48	39	37	55	34	48	48	48
	p-value	<.001	0.001	0.115	<.001	0.025	<.001	0.198	0.08	0.002	<.001	<.001
	N	57	57	43	50	41	39	57	36	50	50	50
EOY GPA	Spearman's rho	0.487***	0.443***	0.291	0.601***	0.427**	0.581***	0.199	0.284	0.395**	0.462***	0.454***
	df	56	56	42	49	40	38	56	35	49	49	49
	p-value	<.001	<.001	0.056	<.001	0.005	<.001	0.135	0.089	0.004	<.001	<.001
	N	58	58	44	51	42	40	58	37	51	51	51
BOY Credit Hours	Spearman's rho	0.352**	0.346**	0.570***	0.318*	0.385*	0.125	0.323*	0.326	0.174	0.272	0.312*
	df	55	55	41	48	39	37	55	34	48	48	48
	p-value	0.007	0.008	<.001	0.025	0.013	0.45	0.014	0.052	0.226	0.056	0.027
	N	57	57	43	50	41	39	57	36	50	50	50
EOY Credit Hours	Spearman's rho	0.347**	0.331*	0.558***	0.281*	0.296	0.112	0.333*	0.448**	0.199	0.289*	0.304*
	df	56	56	42	49	40	38	56	35	49	49	49
	p-value	0.008	0.011	<.001	0.046	0.057	0.49	0.011	0.005	0.162	0.04	0.03
	N	58	58	44	51	42	40	58	37	51	51	51

Learning Acceleration for Girls

Girls make up 48.3% of the Empower[Ed] population, slightly above national CTE averages. Gender-based analyses, using the Kruskal-Wallis Test—a nonparametric test used to make comparisons between multiple independent groups—shown in Table 5, revealed that girls significantly outperformed boys in GPA ($\chi^2(1) = 22.24$, $p < .001$) and in CRPs such as time management ($\chi^2(1) = 8.27$, $p = .004$), problem solving ($\chi^2(1) = 8.03$, $p = .005$), teamwork ($\chi^2(1) = 8.43$, $p = .004$), technical skills ($\chi^2(1) = 9.97$, $p = .002$), and being a responsible employee ($\chi^2(1) = 6.48$, $p = .011$), with moderate to large effect sizes ($\epsilon^2 = 0.11$ – 0.39). However, girls in this sample were less likely than boys to be enrolled in AP courses, which is in contrast to national averages where girls make up 54% of AP enrollment.²⁴

Across each of these variables, pairwise analyses also found significant differences between girls and boys ($p < .011$).²⁵ These findings further demonstrate the program’s ability to promote gender equity in CTE programming while advancing rigorous academic outcomes.

Table E5. Kruskal-Wallis Test of Gender Differences in Student Outcomes

	χ^2	df	p	ϵ^2	Interpretation
BOY GPA	23.1	1	<.001	0.413	Girls began the year with significantly higher GPAs than boys, with a large effect size .
EOY GPA	22.24	1	<.001	0.39	Girls ended the year with significantly higher GPAs, also a large effect size .
AP ENROLLMENT	8.01	1	0.005	0.141	Boys were more likely to be in AP courses, contrasting with national trends; a moderate effect size .
CRP (HS.01): Responsible Employee	6.48	1	0.011	0.114	Girls scored higher on responsibility skills; a moderate effect size .
CRP (HS.01.06): Time Management in Work	8.27	1	0.004	0.145	Girls demonstrated stronger time management; a moderate effect size .
CRP (HS.02): Technical Skills	9.97	1	0.002	0.199	Girls scored higher in technical skills; a large effect size .

24. College Board, 2023

25. The data set for gender was limited to girls and boys, and as a result, may not reflect students who identify as nonbinary but are not coded as such in the student information system.

CRP (HS.02.06): Using Resources to Complete Work	8.04	1	0.005	0.206	Girls outperformed boys in using resources; a large effect size .
CRP (HS.08): Problem Solving	8.03	1	0.005	0.161	Girls had stronger scores in problem-solving; a moderate effect size .
CRP (HS.08.03): Understanding the System	7.13	1	0.008	0.193	Girls demonstrated stronger systems thinking; a large effect size .
CRP (HS.12): Teamwork	8.43	1	0.004	0.169	Girls scored higher on teamwork; a moderate-to-large effect size .
CRP (HS.12.01): Engaging Actively and Respectfully	8.08	1	0.004	0.162	Girls had higher scores on engaging actively and respectfully; a moderate effect size .

Evidence of Quality

To examine how students and teachers experience the [drivers of high quality VHL](#) (effective pedagogy, strong relationships, a foundation for self-directed learning, and technology), fall and spring surveys captured perception data from students and teachers.

Table E6. Quality Driver Student Survey Results

Quality Driver	Survey Item	Percentage of Students who Indicated Often or Always	
		Fall (n=49)	Spring (n=58)
Foundation for Self-Directed Learning	I know what is expected of me to be successful in the program.	95.9%	100.0%
Effective Pedagogy	I feel connected to what we are learning in class.	77.5%	86.2%
	I take part in activities that meet my needs and help me to learn.	95.9%	91.4%
	My teacher provides clear and helpful feedback.	95.9%	91.3%
Strong Relationships	I set goals for my learning, either on my own or with the help of a teacher.	100%	82.8%
	I am able to provide suggestions and feedback on how to improve learning in my class.	93.8%	84.5%

Foundation for Self-Directed Learning

Empower[Ed] nurtures student agency by teaching them how to map standards and manage their time. The item “I know how to manage my time effectively to achieve my learning goals” was strongly correlated with both GPA and credits earned (BOY GPA $\rho = 0.391$, $p = .003$; EOY GPA $\rho = 0.391$, $p = .002$; BOY credits $\rho = 0.350$, $p = .008$; EOY credits $\rho = 0.355$, $p = .006$). While 72.4% reported this often or always, those students consistently outperformed peers, underscoring how self-direction can be an important factor contributing to measurable learning acceleration.

“Our students have learned to foster their independence and confidence by taking an interest and a hands-on approach in their learning. They see their understanding take shape in their school and extended community outside of the school. They graduate with actual real world knowledge and experience that is genuinely authentic and personalized.” - Empower[Ed] Teacher

Effective Pedagogy

Students engaged in rigorous, active learning that could be transferred to new settings such as their diverse community projects, signaling they experienced effective pedagogy. In the survey, the item “I take part in activities that meet my needs and help me to learn” was ranked as often or always by 91.3% of students and correlated significantly with GPA and credits (BOY GPA $\rho = 0.330$, $p = .012$; EOY GPA $\rho = 0.304$, $p = .020$; EOY credits $\rho = 0.314$, $p = .016$). This shows that perceptions of effective pedagogy have a relationship with measurable achievement.

“This is my second year of taking Empower[Ed] and it is the best decision I could’ve possibly made for my learning. I’ve always hated English class and how it was structured, because it always curated to others’ styles of learning and never fit with mine. With Empower[Ed] English, I’m able to meet the standards mandated by the state while also learning in a way that suits me. I feel a great sense of accomplishment and understanding, while also being heard by my teachers.” - Empower[Ed] 12th Grade Student

Strong Relationships

One-on-one mentoring is a hallmark of Empower[Ed]. Students who reported stronger relational support, through goal setting and feedback, earned higher grades and credits (BOY GPA $\rho = 0.371$, $p = .004$; EOY GPA $\rho = 0.384$, $p = .003$; EOY credits $\rho = 0.285$, $p = .030$). Favorable responses were also high with 82.8% of students reporting often or always engaging in goal setting and 87.9% agreeing teachers sought to know them personally.

“We are all very student-first, academics-second. So if there are things going on in that student’s life—whether it’s good things or difficult things—we prioritize those Maslow’s Hierarchy of Needs prior to ‘You need to get that paper written that’s due tomorrow.’ ... The relationship building is huge. And then I think the kids can tell that we genuinely enjoy their company. We genuinely enjoy getting to know them and want the best for our students.” -Empower[Ed] teacher in a focus group with Mathematica

Together, these results establish Empower[Ed] as a high-quality model where student experiences of pedagogy, relationships, and the foundation for self-directed learning are both positive and statistically correlated with academic success.

Conclusion

Empower[Ed] demonstrates that a high-quality hybrid model, built on effective pedagogy, strong relationships, and self-directed learning, can accelerate learning for students across multiple outcomes. Students outperformed their peers in GPA, credit accumulation, and graduation readiness, while also demonstrating strong standards progression throughout the year. College Readiness Practices, including skills such as time management and problem solving, were statistically correlated to these outcomes, confirming that Empower[Ed] builds critical competencies needed for postsecondary success and produces strong academic outcomes.

Appendix F: DaVinci Connect TK-8

Model Snapshot: DaVinci Connect TK-8 - Hawthorne, California

DaVinci Connect—an ungraded, hybrid, homeschool model—empowers students and families to co-design learning pathways that meet academic standards through content that is both relevant and interest-driven. Teachers provide training and coaching to families, offering multiple curricular options and tools to support learning at home and on campus.

Key Findings:

- **Student outcomes:** Students at DaVinci Connect demonstrate high attendance rates and strong academic performance in both math and ELA. Importantly, students consistently outperformed state averages on SBAC Math and ELA across all reported student groups.
- **Attendance as a driver:** At DaVinci Connect, students have very high attendance rates (97.2%) as compared to national rates of attendance and chronic absenteeism.²⁶ Attendance had the strongest relationship with achievement, correlating with both MAP and SBAC results ($\rho = .244-.399$, $p < .001$). To address challenges, DaVinci implemented interventions such as expanding campus time from two to four days per week for targeted students.
- **Equity considerations:** While attendance was strongly correlated with outcomes, it was not associated with MAP growth percentiles. Only a small correlation was observed between students' nutritional support status and ELA growth ($\rho = -.152$, $p = .046$), suggesting that once students are engaged, growth trajectories are equitable across subgroups.
- **Self-directed learning:** A majority of students (86.0%) reported they often or always knew what was expected of them to succeed. This clarity was also positively correlated with SBAC Math performance ($\rho = .145$, $p = .032$), underscoring the role of self-direction in supporting rigorous outcomes.

DaVinci Connect TK-8 is a **hybrid** homeschool model that empowers families as co-teachers three days per week, with the remaining two days focused on standards-aligned, project-based learning when on campus. Families and students have significant agency in deciding what and how they learn throughout the year, with a strong emphasis on learning within the larger Los Angeles community. This model is designed to meet the needs of learners and their families who want to approach learning with authenticity and autonomy.

26. U.S. Department of Education, n.d.

Table F1. Student Demographics at DaVinci Connect TK-8 and Los Angeles Unified for School Year 2024-2025

Demographics	DaVinci Connect TK-8 (n=534)	Los Angeles Unified ²⁷ (n=516,685)
Black or African American	14.6%	7.1%
White	20.5%	9.7%
Asian	5.2%	3.3%
Latine	36.0%	73.6%
Two or More Races	22.0%	2.1%
Receive Nutrition Support	36.9%	82.5%
Qualifies for Special Education Services	13.6%	15.6%
Qualifies for English Language Services	2.6%	21.6%

Model Practices

To understand and evaluate the practices within the DaVinci Connect TK-8 model, we used the [quality drivers of high quality virtual and hybrid learning](#)—effective pedagogy, strong relationships, foundation for self-directed learning, and technology—as the underlying theoretical framework.

Students at DaVinci Connect TK-8, alongside their families, customize their learning to meet academic standards through content that is both relevant and based on their interests.

Teachers at this school provide training and support to students’ families, offering multiple options for curricula and tools to use, different strategies to engage learners, and customized interventions to ensure students make needed progress. Students demonstrate their learning through projects, presentations, and standardized assessments of achievement. In addition, students and families learn and apply Habits of Heart and Mind, a series of durable skills, including agency, empathy, reflection, collaboration, curiosity, and flexibility, that support students’ social-emotional development and the building of a safe, inclusive community.

27. Ed-Data, n.d.

Figure F1. DaVinci Connect TK-8 Logic Model of Learning Acceleration

Inputs	Practices	Outputs	Outcomes
TK-8th grade students who want to customize their learning to authentically pursue areas of interest and engage in community-based learning	Effective Pedagogy ● Participate in ungraded learning focused on performance and standards progression. ● Engage with rigorous content and project-based learning. ● Present demonstrations of learning throughout the year. Strong Relationships ● Students and adults hold one another accountable to their shared values, including building a safe, inclusive community. ● Students learn durable skills, called Habits of Heart and Mind, that support strong relationships and perseverance in the face of challenges. Foundation for Self-Directed Learning ● Students choose how they approach their learning content and often have a say in how they demonstrate mastery. ● Students learn to advocate for themselves, take ownership of their learning, and customize their learning environment to meet their needs. Technology ● Technology is used to offer choices in how students access learning content.	Engagement ↓ Attendance ↓ Participation ↓ Work Completion ★ Active Learning	Traditional Measures ● MAP Growth ● Standardized State Assessments (SBAC) Broader Measures ● Attendance

Data Collection and Analysis

During the 2024-2025 school year, FullScale administered a fall and spring survey for students and teachers to understand the extent to which the high-quality drivers of virtual and hybrid learning were present. DaVinci Connect provided student-level data for enrolled students, including demographic information, NWEA MAP ELA and Math scores, California Smarter Balanced Assessment Consortium (SBAC) ELA and Math scores, and attendance. The FullScale research team also conducted a site visit to observe student demonstrations of learning. To contextualize student outcomes, the research team compared DaVinci Connect's SBAC scores compared to state-wide results.

The FullScale research team de-identified all of the data and then analyzed it using descriptive statistics. Analyses of skewness, kurtosis, distribution, and normality supported an initial understanding of the data and were used to determine appropriate subsequent tests that would identify relationships between variables. This approach is consistent with best practices for exploratory data analysis in educational research (Tabachnick & Fidell, 2013). Given that the data did not meet assumptions of normality, nonparametric tests were utilized to preserve the validity of statistical inferences (Gibbons & Chakraborti, 2011).

To examine bivariate associations, Spearman's rank-order correlation was used, which is well-suited for non-normally distributed data (Siegel & Castellan, 1988). For variables with statistically significant relationships, the Kruskal-Wallis test was conducted to assess differences between groups, followed by the Dwass-Steel-Critchlow-Fligner (DSCF) test for post-hoc pairwise comparisons.

Evidence of Learning Acceleration

To understand learning acceleration at DaVinci Connect TK-8, we examined attendance, NWEA MAP, and California Smarter Balanced Assessment Consortium (SBAC) performance, disaggregating by socioeconomic status and race.

California Smarter Balanced Assessment Consortium (SBAC)

At the time of analysis, California had not yet released SBAC results for the 2024-2025 school year. However, Spearman's correlation revealed that DaVinci Connect TK-8's 2023-2024 and 2024-2025 SBAC results are highly correlated (ρ ranging from .625-.737, $p < .001$) indicating a comparative analysis of 2023-2024 data would be appropriate to understand learning acceleration. Their students outperformed state averages, which largely mirror the greater Los Angeles area, across all reported student populations.

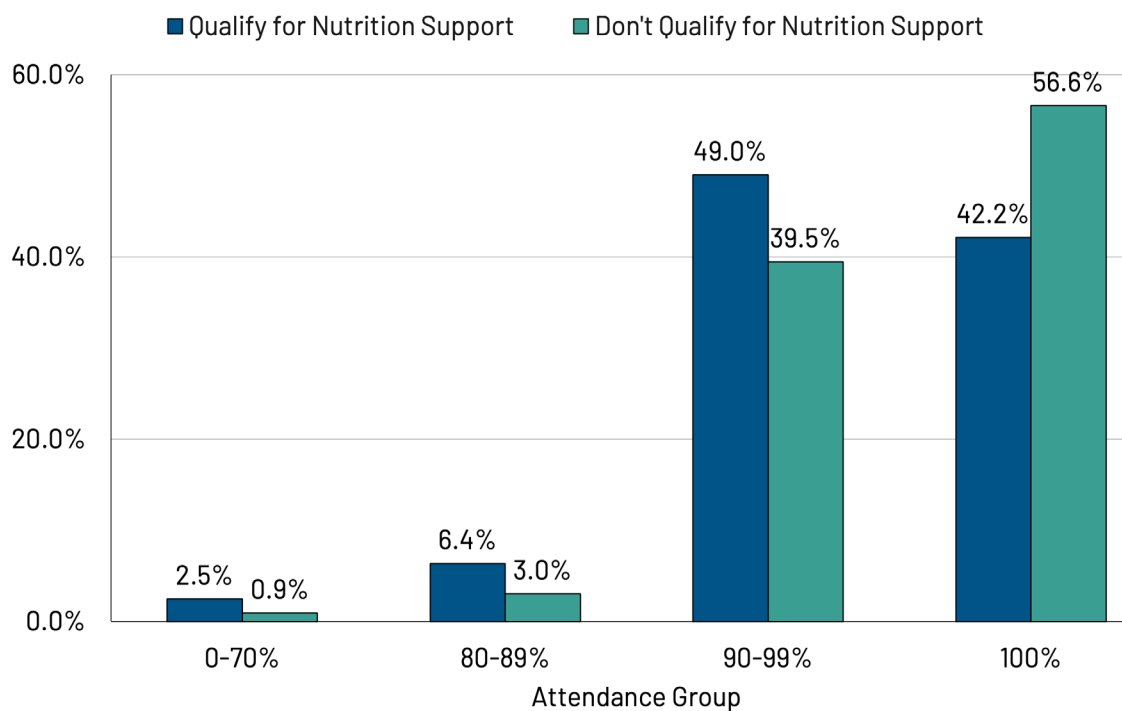
Table F2. Average Percentage of Students Meeting or Exceeding Standards on the 2024 SBAC

Student Group	DaVinci Connect ELA Average	California State ELA Average	DaVinci Connect Math Average	California State Math Average ²⁸
All Students (n=267)	60.7%	47%	46.1%	36%
Black or African American (n=35)	48.6%	30%	37.1%	18%
White (n=65)	65.6%	60%	63.1%	50%
Asian (n=18)	88.9%	72%	72.2%	66%
Latine (n=88)	52.3%	37%	30.7%	24%
Qualifies for Nutrition Support (n=101)	45.5%	37%	30.7%	25%

The Relationship Between Attendance, Socioeconomic Status, and Achievement

In a moment when we're seeing [persistent chronic absenteeism](#) in the field, at DaVinci Connect TK-8, we observed high attendance rates and high math and ELA scores. Attendance at DaVinci Connect TK-8 had the strongest relationship with student academic outcomes (p ranging from .244-.399, $p < .001$) including NWEA MAP scores and SBAC in Math and ELA.

Figure F2. Attendance Rates by Student Nutrition Support Status



28. Hill & Gao, 2019; Total student count is not reported.

When disaggregating this data further, we identified that students’ nutritional support status was also correlated with achievement in Math and ELA (ρ ranging from $-.235$ to $-.328$, $p < .001$) and attendance ($\rho = -.161$, $p < .001$). **These findings suggest that students who qualify for nutritional support, often a proxy for lower socioeconomic status, are statistically less likely to have higher achievement and attendance.** Recognizing the unique needs of these learners, DaVinci Connect TK-8 developed interventions such as having students attend their campus four days a week instead of two to support higher attendance and access to learning.

These interventions appear to be worthwhile. Table 2 on the following page shows the statistical relationships between NWEA MAP Growth Percentiles, Attendance, and Nutrition Support Status using Spearman’s rho - a nonparametric alternative to Pearson’s correlation. Since we had small sample sizes, and that the data was not normally distributed, this was a more appropriate statistical test to understand relationships. In our analysis, although student attendance was strongly correlated with academic assessments, it was not correlated with student growth percentiles on NWEA MAP meaning that ALL students continued to make progress.

Similarly, only a small correlation ($\rho = -.152$, $p=.046$) was observed between students’ nutritional support status and ELA growth. **These findings suggest that while there are disparities in academic scores, even the most vulnerable students at DaVinci Connect TK-8 are growing at a statistically similar rate throughout the year.**

Table F3. Correlations between NWEA MAP Growth Percentiles, Attendance, and Nutrition Support

		Full Year Attendance Rate	Nutritional Support Status	ELA Fall to Winter Growth Percentile	Math Fall to Winter Growth Percentile
Full Year Attendance Rate	Spearman's rho	—			
	df	—			
	p-value	—			
	N	—			
Nutritional Support Status ²⁹	Spearman's rho	$-.161^{***}$	—		
	df	532	—		
	p-value	$<.001$	—		
	N	534	—		

29. When coding variables, students who qualified for nutritional support were given a value of “1” and students who did not qualify were given a value of “2”. As such, a positive correlation means that students who qualify for nutritional support were more likely to have a higher outcome and conversely, a negative correlation denotes that students who do not qualify for nutritional support are more likely to have a higher outcome.

ELA Fall to Winter Growth Percentile	Spearman's rho	0.084	-0.152**	—	
	df	430	430	—	
	p-value	0.081	0.002	—	
	N	432	432	—	
Math Fall to Winter Growth Percentile	Spearman's rho	0.091	-0.083	0.281***	—
	df	435	435	408	—
	p-value	0.058	0.082	<.001	—
	N	437	437	410	—

Evidence of High Quality Practices

To examine how students and teachers experience the [drivers of high-quality VHL](#) (effective pedagogy, strong relationships, a foundation for self-directed learning, and technology), fall and spring surveys were administered to students at DaVinci Connect TK-8.

Table F4. Quality Driver Student Survey Results

Quality Driver	Survey Item	Percentage of Students who Indicated Often or Always	
		Fall (n=242)	Spring (n=232)
Foundation for Self-Directed Learning	I know what is expected of me to be successful in the program.	79.8%	86.0%
Effective Pedagogy	I feel connected to what we are learning in class.	79.3%	67.2%
	I take part in activities that meet my needs and help me to learn.	73.2%	65.1%
	My teacher provides clear and helpful feedback.	78.7%	85.8%
Strong Relationships	I set goals for my learning, either on my own or with the help of a teacher.	58.4%	55.6%
	I am able to provide suggestions and feedback on how to improve learning in my class.	73.8%	60.1%

Foundation for Self-Directed Learning

Students being able to direct their own learning is an essential component of DaVinci Connect TK-8's hybrid homeschool model. A key component to self-directed learning is understanding what is expected in order to achieve success. Survey data revealed that 86.0% of students indicated they often or always understood the expectations for success. This perception was also positively correlated with SBAC Math performance ($\rho = .145$, $p = .032$).

"We do tell kids to self advocate. We teach them you need to speak up and say if you need something. We especially do that with kids that are on an IEP or a 504 plan you can say, 'Hey, I need a calculator. I'm allowed to have one,' or 'an you repeat that because it went too fast for me?' [We try to teach them that self advocacy—directly teach them about it, because otherwise they'll just sit quiet[ly] a lot of times and not get what they need. We think about [the fact] that these kids are almost in high school, and so they really need to speak up for themselves." -DaVinci Teacher in an interview with Mathematica

Effective Pedagogy

In DaVinci Connect, effective pedagogy looks like measuring student progress by standards rather than grades and students driving their own learning around their interests and communities. As one student described, "[I like] doing entertaining projects that are on topics that I am interested in [that] help with my learning and get me more motivated to work on them." Students described their learning as both challenging and flexible, which mirrors the model's design to tailor learning to student and family's needs and interests.

- 67.2% of students indicated they often or always "feel connected to what we are learning in class." This survey item was positively correlated to student growth in NWEA MAP English Language Arts (ELA) ($\rho = .142$, $p < .046$).
- Similarly, "I take part in activities that meet my needs and help me to learn" had 65.0% of students selecting often or always, and was correlated to higher student attendance ($\rho = .135$, $p < .042$), NWEA MAP Math performance (ρ ranging from .183-.308, $p < .008$) and SBAC Math performance ($\rho = .166$, $p < .013$).

While these two survey items experienced a dip in the number of students selecting often or always on the spring iteration of the survey, the distribution of students still remained positively skewed (Figures F2 and F3). With the vast majority of students experiencing variables connected to effective pedagogy at least sometimes, it indicates that a relationship likely exists between meaningful instruction that is aligned to students' needs and higher academic achievement.

Figure F3. Fall to Spring Distribution of Student Connection to Learning Content

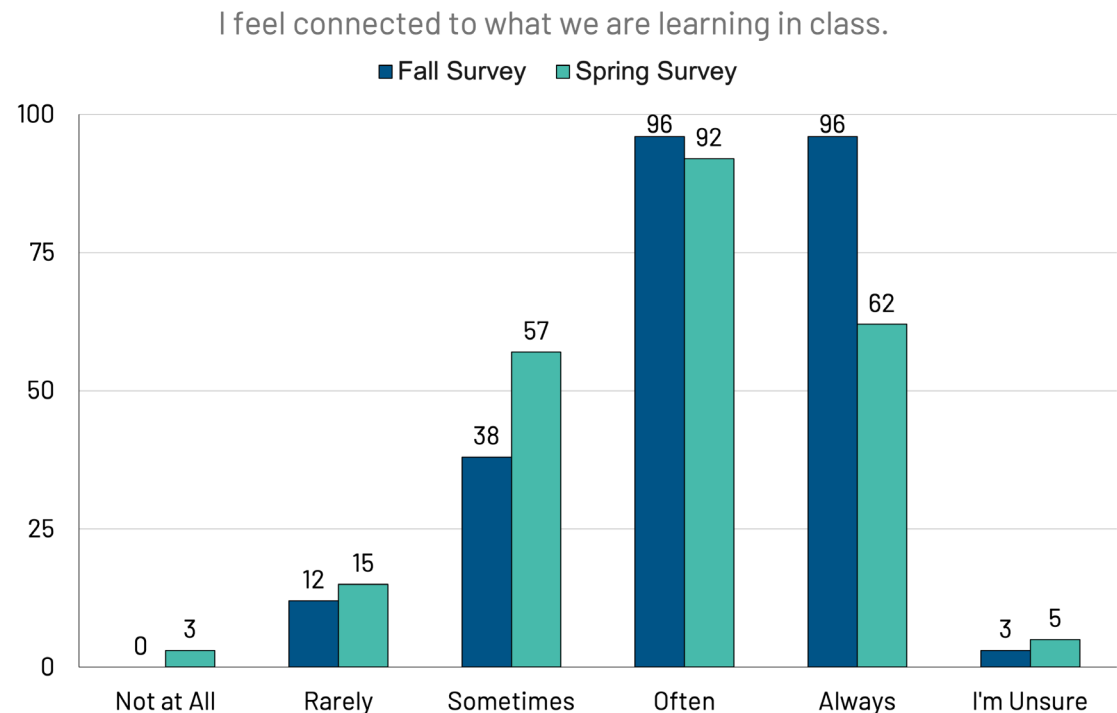
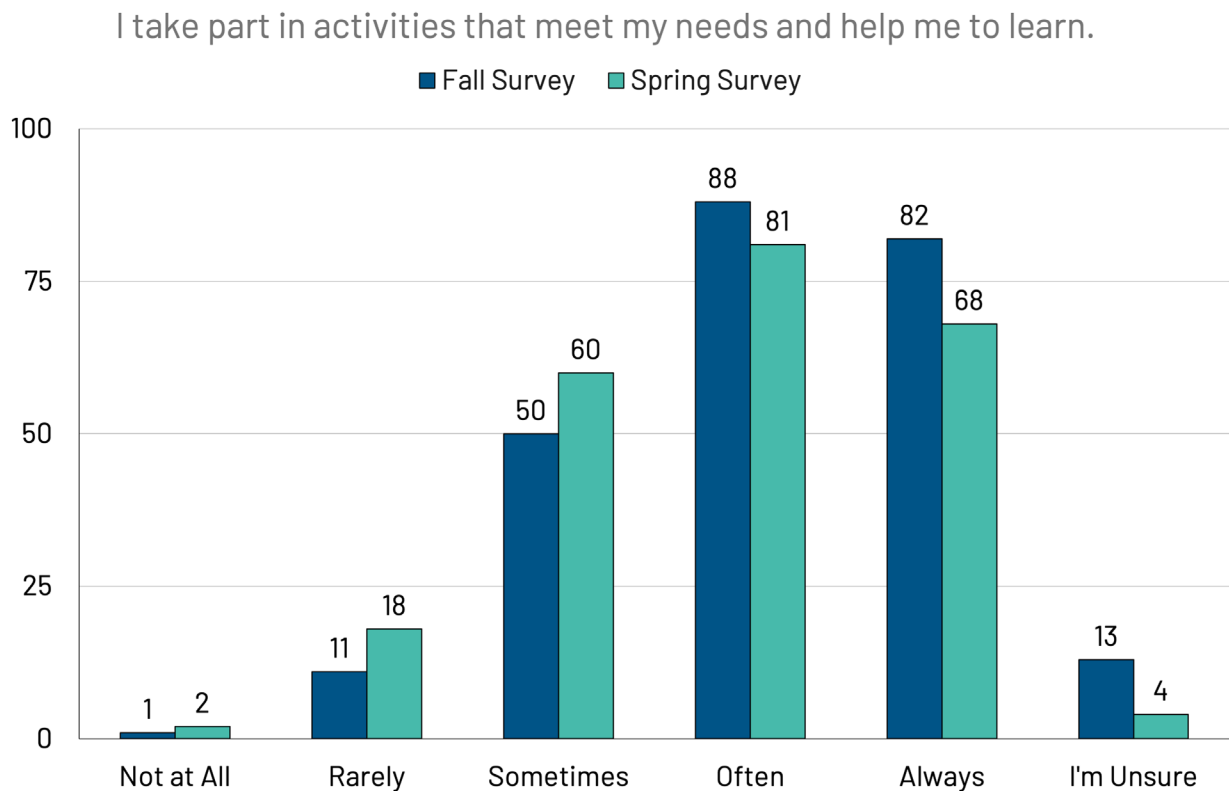


Figure F4. Fall to Spring Distribution of Students' Perception of Learning Activities that Meet Their Needs



"At school they are able to benefit from collaboration and enough structure that they get used to due dates and expectations. At home, they get to explore their interests and move at their own pace." - DaVinci Connect TK-8 Teacher

Strong Relationships

DaVinci Connect TK-8's model focuses on building durable skills, a deep sense of belonging, and a community that resolves conflict peacefully, with the goal of fostering strong relationships. Within their model, there is a significant focus on restorative practices, where students are respected and empowered to talk through conflicts, mediate solutions, and build mutual trust. Students, teachers, and families all contribute to decision making and modeling values, building a strong sense of belonging and psychological safety. As one teacher described in an interview with Mathematica, *"I do cold-calling on kids, because they're more engaged if they know they could be called on. But before I start doing that, we really set up an environment where it's like, 'What if you don't know when I call on you? Is that okay? Is it okay to say, 'I really don't know how to do that.' Is it even okay to say, 'I'm sorry I wasn't paying attention, can you repeat that?'" This is a place where everyone can make mistakes. Everybody can try things. So it is about setting that culture first.*

Students indicated that these practices were realized with 76.5% indicating their teacher often or always took time to know them personally. Likewise, 60.6% shared they often or always were "able to provide suggestions and feedback on how to improve learning in my class" which was correlated significantly with growth on NWEA MAP ELA ($\rho = .151$, $p = .033$).

"I love how they let me be creative, curious, and myself without fear of punishment or getting in trouble. The hands-on project-based learning really helps me to understand what I'm learning and makes me want to share my knowledge with others. It also makes me very proud of my work. I even make Presentations of Learning about topics I learn about in homeschool because I love them so much. This learning style makes me able to ask questions in class during discussions, and I feel safe enough here to share my thoughts to everyone." - DaVinci Connect TK-8 8th Grade Student

Conclusion

DaVinci Connect TK-8 demonstrates how a high-quality hybrid homeschool model can accelerate learning by combining effective pedagogy, strong relationships, and a foundation for self-directed learning. Students report positive experiences that align with the quality drivers of virtual and hybrid learning, and these practices translate into measurable outcomes. The school maintains high attendance, which is strongly correlated with achievement. All students, regardless of socioeconomic status, grew at similar rates on NWEA MAP, and SBAC results show that students outperformed California averages across demographic groups.

While opportunity gaps remain, particularly by race and income, DaVinci ensures that once students are engaged, they experience learning acceleration at rates comparable to their peers. Together, this evidence positions DaVinci Connect TK-8 as a rigorous, student-centered model of hybrid learning that advances both academic achievement and whole-child development.

Appendix G: Friendship Collegiate Online

Model Snapshot: Friendship Collegiate Online - Washington, D.C.

Friendship Collegiate Online is a fully virtual high school that combines high-quality curricula (Edmentum and district curriculum), intentional community building, and individualized support from learning coaches to deliver rigorous, relationship-centered virtual learning. This school serves a high population of historically marginalized learners, as well as students experiencing social anxiety, medical concerns, or poverty.

Key Findings:

- **Academic outcomes:** Friendship outperformed both comparison high schools on nearly every academic outcome, with statistically significant NWEA MAP growth from fall to spring in ELA (Comparison 2: $W = -4.15$, $p = .009$) and in Math (Comparison 1: $W = -5.10$, $p < .001$; Comparison 2: $W = -3.63$, $p = .028$). These differences suggest that Friendship Collegiate Online is accelerating learning for students at a greater rate in the virtual environment.
- **Engagement and performance:** Students' work completion was strongly correlated with course grades, with total activities completed, percentage of activities completed, and final grades being all positively associated ($\rho = .354-.646$, $p < .001$).
- **Equity impact:** C Students with disabilities make up a larger share of the population than in comparison schools. Unlike those peers, however, they **perform at rates comparable to students without Individualized Education Programs (IEPs)**, demonstrating Friendship's ability to narrow performance gaps.
- **Student experience:** Survey data confirmed the existence of high-quality virtual practices. Feeling connected to learning and receiving regular feedback were both significantly correlated with GPA ($\rho = 0.263-0.305$, $p < .006$). Similarly, goal-setting was positively correlated with GPA ($\rho = 0.255-0.283$, $p < .014$), reinforcing the importance of relational practices in driving academic outcomes.

Friendship Collegiate Online is a **virtual** high school that offers learning in core subjects, dual enrollment through Arizona State University, and AP courses. This model, which has been operating for over seven years, places a strong emphasis on building community with weekly town halls that highlight student successes as well as monthly in-person events for students and their families. As a school that serves a high population of learners experiencing social anxiety, medical concerns, or poverty, educators and administrators emphasize relationship building and targeted support for learners, including delivering meals and school supplies throughout the year.

Table G1. Student Demographics of Friendship Collegiate Online, Comparison High School 1 and Comparison High School 2 for School Year 2024-2025

Student Demographics	Friendship Collegiate Online (n=232)	Comparison 1 (n=301)	Comparison 2 (n=365)
Black or African American	93.1%	100.0%	98.6%
White	3.0%	0.0%	0.3%
Asian	0.4%	0.0%	0.0%
American Indian	3.4%	0.0%	0.8%
Pacific Islander	0.0%	0.0%	0.3%
Economically Disadvantaged³⁰	73.7%	68.4%	69.4%
Qualifies for Special Education Services	31.5%	Not Reported	18.9%

Model Practices

To understand and evaluate the practices within the Friendship Collegiate Online model, we used the [quality drivers of high quality virtual and hybrid learning](#)—effective pedagogy, strong relationships, foundation for self-directed learning, and technology—as the underlying theoretical framework. This model of using high-quality curricula (Edmentum), high-quality broadcasting technology, and learning coaches for individualized students directly aligns to these drivers. In addition, new 9th grade students at Friendship Collegiate Online have the opportunity to engage in a *Summer Bridge* program and orientation to prepare them for rigorous course content, set up their learning space and schedule, as well as learn the soft skills necessary to successfully navigate the school.

30. Students are designated “Economically Disadvantaged” by the system which is determined by a number of variables related to socioeconomic status including whether a student is receiving federal or local financial assistance, in the foster care system, designated as homeless, or overaged.

Figure G1. Friendship Collegiate Online Logic Model of Learning Acceleration

Inputs	Practices	Outputs	Outcomes
9th-12th grade, fully-virtual students from Friendship Online Academy who need greater flexibility or social-emotional support	Effective Pedagogy - Utilize Edmentum, a high quality, accessible curriculum. Strong Relationships - Collaborate with an online learning coach. - Co-create and foster a shared virtual learner culture through weekly town halls and celebrations. Foundation for Self-Directed Learning - Students have choices in course pacing. - Students can choose to join breakouts with their teachers for individual support. Technology - High-quality, uniform technology use to enable access to learning. - Nearpod is used regularly to facilitate learning.	Engagement ↓ Attendance ↓ Participation ↓ Work Completion ★ Active Learning	Traditional Measures - NWEA MAP - GPA - Credits Earned - PSAT/SAT Broader Measures - Attendance - Course Engagement

Data Collection and Analysis

During the 2024-2025 school year, FullScale administered a fall and spring survey for students and teachers to understand the extent to which the high-quality drivers of virtual and hybrid learning were present. Friendship Public Charter provided student-level data for enrolled students, including demographic information, NWEA MAP ELA and Math scores, GPA, credits earned, PSAT scores, SAT scores, attendance, and course engagement metrics. In addition, Friendship Public Charter provided student-level data from two other high schools in their network to support contextualization of student performance.

The FullScale research team de-identified all of the data and then analyzed it using descriptive statistics. Analyses of skewness, kurtosis, distribution, and normality supported an initial understanding of the data and were used to determine appropriate subsequent tests that would identify relationships between variables. This approach is consistent with best practices for exploratory data analysis in educational research (Tabachnick & Fidell, 2013). Given that the data did not meet assumptions of normality, nonparametric tests were utilized to preserve the validity of statistical inferences (Gibbons & Chakraborti, 2011).

To examine bivariate associations, Spearman's rank-order correlation was used, which is well-suited for non-normally distributed data (Siegel & Castellan, 1988). For variables with statistically significant relationships, the Kruskal-Wallis test was conducted to assess differences between groups, followed by the Dwass-Steel-Critchlow-Fligner (DSCF) test for post-hoc pairwise comparisons.

Evidence of Learning Acceleration

To understand learning acceleration at Friendship, we used a variety of academic variables, such as NWEA MAP, PSAT, SAT, GPA, and broader measures such as attendance. To help contextualize learning acceleration, we also examined data across the same measures from two high schools within the charter network.

Friendship Collegiate Online outperformed the two comparison high schools across nearly every academic variable, with statistically significant differences in NWEA MAP growth from the fall to spring in ELA as compared to Comparison High School 2 ($W = -4.15$, $p = .009$) and in math compared to Comparison High School 1 ($W = -5.1$, $p < .001$) and Comparison High School 2 ($W = -3.63$, $p = .028$). These differences suggest that Friendship Collegiate Online is accelerating learning for students at a greater rate in the virtual environment.

Another facet of learning acceleration is how students progress through each course. At Friendship Collegiate Online, students on average complete 88.3% of the assigned course activities and earn an average grade of 73.5%. These high work completion rates are indicative of students engaging in their learning, with average grades indicating the quality of the work largely meets expectations to earn a passing score.

Students' work completion is also associated with their overall course grades. Table 4 on the following page shows the statistical relationships between total activities completed, percentage of activities completed, and course grades using Spearman's rho—a nonparametric alternative to Pearson's correlation. Since we had small sample sizes, and that the data was not normally distributed, this was a more appropriate statistical test to understand relationships. Spearman's correlation revealed that the total number of activities completed, the percentage of the activities completed from the total assigned, and course grades were all positively correlated ($\rho = .354 - .646$, $p < .001$). These findings suggest that the more students completed assignments for their courses, the better grades they would receive.

Table G2. Academic Outcomes for Friendship Collegiate Online and Two Comparison High Schools

Student Outcomes for School Year 24-25	Friendship Collegiate Online	Comparison High School 1	Comparison High School 2
Full Year Attendance Rate	85.8%	88.7%	88.1%
Cumulative GPA	2.18	Not Reported	1.33
First Semester GPA	2.23	Not Reported	1.31
ELA BOY MAP Median Percentile	44	45	42
Math BOY MAP Median Percentile	29*	37*	33
ELA MOY MAP Median Percentile	46.5	40	40
Math MOY MAP Median Percentile	32	34	32
ELA EOY MAP Median Percentile	59*	45*	47*
Math EOY MAP Median Percentile	43	35.5	37
ELA MAP Fall to Spring Median Growth Percentile	64.5*	52	47.5*
Math MAP Fall to Spring Median Growth Percentile	62*	43*	49*

Note: * indicates statistically significant difference ($p < .05$).

Table G3. Percentage of Activities Completed by Course

Course Name	Number of Students Enrolled	AVERAGE of Percentage of Activities Completed	AVERAGE of Total Activities	AVERAGE of Grade
Algebra 1 Semester A 24-25	47	98.8%	56	56.9%
Algebra 2 Semester A 24-25	38	82.2%	49	78.3%
AP Language and Composition	16	73.4%	44	72.0%
English 10 Semester A	48	87.9%	49	68.9%
English 11 Semester A	33	81.5%	45	68.9%
English 11 Semester B	10	84.7%	39	68.3%
English 12 Semester A	36	88.8%	48	76.5%
English 12 Semester B	35	97.6%	43	88.0%
English 9 Semester A	56	95.6%	65	56.2%
World History I Semester A	59	87.9%	30	62.7%
World History II Semester A	62	96.7%	31	70.1%

Biology Semester A	44	98.3%	65	78.7%
Environmental Science Semester A	42	97.6%	27	61.2%
Environmental Science Semester B	25	99.9%	32	81.5%
Financial Math Semester A	41	97.4%	33	76.2%
Health	48	83.4%	35	91.1%
Physics Online Semester A	52	89.8%	28	59.1%
PLATO Course Introduction to Finance	45	62.4%	36	72.5%
PLATO Course Introduction to Visual Arts	70	72.4%	26	79.2%
PLATO Course Music Appreciation	81	77.2%	28	88.5%
PLATO Course Physical Education	75	89.3%	17	85.2%
PLATO Course World History Semester B	39	94.8%	44	73.6%
Probability and Statistics Semester B	39	93.8%	57	77.7%
Total Average	45.3	88.3%	40	73.5%

Table G4. Spearman's Correlation of Activities Completed and Course Grades

		Total Activities Completed	Percentage of Activities Completed	Course Grade
Total Activities Completed	Spearman's rho	—		
	df	—		
	p-value	—		
	N	—		
Percentage of Activities Completed	Spearman's rho	0.524***	—	
	df	1167	—	
	p-value	<.001	—	
	N	1169	—	
Course Grade	Spearman's rho	0.354***	0.646***	—
	df	1167	1167	—
	p-value	<.001	<.001	—
	N	1169	1169	—

Accelerating Learning for Students with Disabilities

Students with disabilities represent a larger share of the Friendship Collegiate Online population. Unlike peers in comparison schools, they perform at rates similar to students without IEPs. For example, spring NWEA MAP results show significant positive correlations between disability status and achievement at the comparison school (Math Spring $\rho = 0.478$, $p < .001$; ELA Spring $\rho = 0.448$, $p < .001$), while no such disparities were observed at Friendship Collegiate Online.

Table G5. Students with Disabilities NWEA Map Performance Across Two Contexts

		Friendship Collegiate Online Special Education	Comparison School High School 2 Special Education
Math MAP Fall to Winter Growth Percentile	Spearman's rho	0.101	0.015
	df	115	333
	p-value	0.279	0.788
	N	117	335
ELA MAP Fall to Winter Growth Percentile	Spearman's rho	-0.026	0.115*
	df	116	326
	p-value	0.78	0.038
	N	118	328
Math Spring Test Percentile	Spearman's rho	0.161	0.478***
	df	125	303
	p-value	0.07	<.001
	N	127	305
ELA Spring Test Percentile	Spearman's rho	0.262**	0.448***
	df	126	304
	p-value	0.003	<.001
	N	128	306
Math MAP Fall to Spring Growth Percentile	Spearman's rho	0.015	0.185**
	df	125	303
	p-value	0.87	0.001
	N	127	305
ELA MAP Fall to Spring Growth Percentile	Spearman's rho	-0.132	0.177**
	df	126	304
	p-value	0.137	0.002
	N	128	306

Evidence of High Quality

To examine how students and teachers experience the [drivers of high quality VHL](#) (effective pedagogy, strong relationships, a foundation for self-directed learning, and technology), fall and spring surveys were administered.

Table G6. Quality Driver Student Survey Results

Quality Driver	Survey Item	Percentage of Students who Indicated Often or Always	
		Fall (n=133)	Spring (n=108)
Foundation for Self-Directed Learning	I know what is expected of me to be successful in the program.	82.8%	88.0%
Effective Pedagogy	I feel connected to what we are learning in class.	51.9%	50.4%
	I take part in activities that meet my needs and help me to learn.	60.2%	65.1%
	My teacher provides clear and helpful feedback.	62.9%	74.5%
Strong Relationships	I set goals for my learning, either on my own or with the help of a teacher.	41.7%	55.7%
	I am able to provide suggestions and feedback on how to improve learning in my class.	51.6%	51.9%

Foundation for Self-Directed Learning

At Friendship Collegiate Online, all of the courses are formatted similarly to ensure students can access content and learn what is expected for success. To support this effort, students have learning coaches. As one student described in an interview with Mathematica, “Learning coaches are definitely a big part of Friendship. Learning coaches could be, you know, [your] aunt, you live with your mother, your father, you know it could be anyone that you live with, or you’re, you know, in a space with. And they really do help you keep you on track especially for students who may feel like they have more leeway to do things or like, you know, they go somewhere, and they’re in a Zoom. They’re probably paying attention. You have the learning coaches there to really guide you, and especially if you’re getting off track.”

Students reported that this clarity of expectations remained high across the year, with 88.0% of students in the spring reporting they often or always knew what was expected to succeed. **This item was positively correlated with GPA ($\rho = .288$, $p < .003$), indicating that self-direction and clear expectations contribute to stronger performance.**

"Personally, for me, it's definitely been helpful because I'm a person that really likes to work independently. So having my own space where I can really make this space comfortable to really help me in the learning process. [When it's online], you have that option to do [things] different with like studying and having office hours with the teachers...In a way, it almost reminds me of college...it's like you have your own schedule, your own thing that you can work with. So, for me, online has definitely been a really helpful way to manage my time, manage my schedule, and manage how I do things." - Friendship Collegiate Online Student in an interview with Mathematica

Effective Pedagogy

Students engage with a consistent, high-quality curriculum, Edmentum, and their teachers design classrooms that are tailored to support virtual learners. In the spring, 50.4% of students reported often or always feeling connected to what they were learning, and 65.1% said that activities met their needs and helped them learn. A growing majority (74.5%) also reported receiving clear and helpful feedback from teachers. These survey items not only indicated that the majority of students regularly experienced effective pedagogy, but feeling connected to learning and receiving regular feedback have significant positive correlations with GPA ($p = 0.263 - 0.305$, $p < .006$).

"First I was a student who didn't want to do school at all but as I came into Friendship Collegiate Online, it made me want to learn more, connect with more people socially, and help out in ways that I can! It also changed how I learned by teaching me things I never knew before!" - Friendship College Online 10th Grader

Strong Relationships

Friendship Collegiate Online focuses on building strong relationships between students, educators, and families through individualized support and community events. As one parent described in an interview with Mathematica, *"I think Friendship has really created this circle, family environment, where [students] feel safe, where they not only are helpful with me, and closing the loop to make the girls feel safe, but the girls now feel safe advocating on their own. I feel like they [get] one-on-one attention that they can have with teachers... the teachers [are] accessible."*

In the spring, 55.7% of students reported often or always setting goals, and 51.9% reported opportunities to provide feedback on how to improve learning. Student goal setting was significantly correlated with GPA ($p = 0.255-.283$, $p < .014$).

"Initially, my students were somewhat inconsistent in meeting online learning expectations. However, through collaborative efforts, consistent parent communication, unambiguous expectations, strategic data checkpoints, and the use of varied instructional modalities, their performance has improved significantly. As a result, many of them are now among the highest GPA earners both in the building and in the online program. Currently, six of my students were inducted into the National Honor Society this month." - Friendship Collegiate Online Teacher

Together, these findings confirm that Friendship Collegiate Online embodies the hallmarks of high-quality hybrid learning. Student perceptions of pedagogy, relationships, and self-direction are not only positive but also statistically related to higher GPAs, providing evidence that the quality drivers impact student learning.

Conclusion

Friendship Collegiate Online demonstrates that a fully virtual high school can provide high-quality, accelerated learning when built on the drivers of pedagogy, relationships, and self-directed learning. Students report clarity of expectations, supportive relationships, and effective feedback. Academic outcomes confirm learning acceleration, with higher MAP growth percentiles and GPAs compared to peers at other schools, and with students with disabilities achieving at similar rates to general education peers. Together, these findings show that Friendship Collegiate Online is a rigorous, community-centered model of virtual education that supports learning acceleration for diverse student populations.

Appendix H: Novi Virtual

Model Snapshot: Novi Virtual – Novi, Michigan

Novi Virtual allows students to seamlessly transition from in-person learning to the online program, ensuring continuity for those traveling or needing more flexible options. The program also partners with neighboring districts to re-engage students who have been previously disengaged from traditional school due to chronic absenteeism, behavioral challenges, medical needs, or potential expulsion.

Key Findings:

- **Acceleration through access:** Novi Virtual accelerates learning by providing access to courses and flexible pathways that would not otherwise be available. Both Novi's own students and Partner District high school students outperformed state averages in course pass rates across core subjects, demonstrating the model's effectiveness.
- **Time in program matters:** The longer students were enrolled in Novi Virtual, the higher their attendance and grades. For Partner District students in particular, longer enrollment was significantly correlated with improvements in attendance and grades ($\rho = -.538$ to $.831$, $p < .001$), suggesting that the model can be effective, but it may take time for disengaged students to make progress.
- **Pedagogy and outcomes:** Survey items related to effective pedagogy, including feeling connected to learning and receiving helpful feedback, were significantly correlated with GPA ($\rho = .318$ – $.370$, $p < .013$), showing that when students perceive instruction as responsive and aligned to their needs, they perform better academically.
- **Relationships and re-engagement:** Relational practices such as goal-setting and providing feedback on their learning were also significantly correlated with GPA ($\rho = .297$ – $.314$, $p < .021$). These results highlight that **when students build stronger relationships with teachers, they are more likely to succeed academically**, especially for Partner District students who had been previously disengaged ($\rho = -.442$ to $-.310$, $p < .018$).

Novi Virtual is both a full- and part-time **virtual** program, allowing students flexibility in accessing courses that may not be available at their home school or continuing their learning when gone from their brick-and-mortar school for extended periods of time whether due to illness, injury, or travel. **As a school system that has a high population of students with families living internationally, Novi Virtual offers students the possibility of remaining in the school system, and receiving the same high-quality instruction that they would if they were in person, while traveling abroad.** As a result, Novi Community School District students are able to seamlessly transition from in-person learning, to the virtual program, allowing for them to remain enrolled in the school system while traveling for extended periods of time.

In addition, Novi Virtual has forged partnerships with neighboring school systems to serve students who have been disengaged from traditional in-person schooling due to chronic absenteeism, behavioral challenges, medical needs, or potential expulsions. By serving this growing population of learners, Novi has cultivated an individualized approach to student onboarding with the goal of using their model as a restorative intervention for students who would otherwise be disengaged from school entirely.

Table H1. Novi Virtual Student Demographics

Demographics	Novi Virtual Total Population (n=160)	Novi Community School District Students (n=114)	Partner District Student (n=46)	Novi Community School District Total Population ³¹ (n=6,775)
Black or African American	10.0%	5.2%	21.7%	7.3%
White	41.9%	31.6%	67.4%	34.0%
Asian	43.1%	58.8%	4.3%	49.0%
Latine	2.5%	1.8%	4.3%	4.6%
American Indian	0.6%	0.9%	0.0%	0.1%
Two or More Races	1.9%	1.8%	2.2%	3.9%
Qualifies for Special Education Services	6.9%	7.0%	6.5%	7.7%

Model Practices

To understand and evaluate the practices within the Novi Virtual model, we used the [quality drivers of high quality virtual and hybrid learning](#)—effective pedagogy, strong relationships, foundation for self-directed learning, and technology—as the underlying theoretical framework. Novi’s focus on delivering the same high-quality instruction that students experience within in-person classrooms, while providing targeted support and interventions to ensure every student can access learning online, directly aligns to these drivers. Students attend Novi Virtual for many different reasons, including course access, staying enrolled in the school system while traveling, gaining flexibility to attend to medical needs, or having a restorative option to stay in school when otherwise disengaged. As a result, learning at Novi Virtual needs to be contextualized with the very real reality that the program serves students who are often deemed invisible by system-wide data collection: learners who would otherwise not have an opportunity to engage in learning because traditional in-person systems have not worked.

31. Michigan Department of Education, n.d.

Figure H1. Novi Virtual Logic Model of Learning Acceleration

Inputs	Practices	Outputs	Outcomes
7th–12th grade learners who are pursuing course access or need to stay connected to learning when traveling or have otherwise been disengaged from traditional, in-person learning due to chronic absenteeism, behavioral challenges, or expulsion	Effective Pedagogy ● Experience high quality, district-created curricula that is the same as it is in-person. Strong Relationships ● Individual educator connections to students to support their transition to the program. Foundation for Self-Directed Learning ● Utilize flexible schedules designed to meet students' varied needs. ● Participate in a customized orientation at date of enrollment to ensure learners understand expectations. Technology ● High-quality, uniform technology use to enable access to learning and limit barriers to accessing learning.	Engagement ↓ Attendance ↓ Participation ↓ Work Completion ★ Active Learning	Traditional Measures ● GPA ● Grades Broader Measures ● Attendance

Data Collection and Analysis

During the 2024–2025 school year, FullScale administered a fall and spring survey for students and teachers to understand the extent to which the high-quality drivers of virtual and hybrid learning were present. Novi Community School District provided student-level data for enrolled students, including demographic information, course grades, GPA, credits earned, and course attendance. To support contextualization of student performance, the research team used [Michigan Virtual's Dashboard](#) to gather available, aggregate, state-wide virtual student performance data by both alternative and general education model types.

The FullScale research team de-identified all of the data and then analyzed it using descriptive statistics. Analyses of skewness, kurtosis, distribution, and normality supported an initial understanding of the data and were used to determine appropriate subsequent tests that would identify relationships between variables.

This approach is consistent with best practices for exploratory data analysis in educational research (Tabachnick & Fidell, 2013). When the data did not meet assumptions of normality, nonparametric tests were utilized to preserve the validity of statistical inferences (Gibbons & Chakraborti, 2011). For student attendance rates, yearly averages were calculated by averaging the number of course absences by student, divided by the total number of days enrolled. Chronic absenteeism was determined if a student had less than 90% attendance. Analysis of data indicated it did not meet assumptions of normality, so nonparametric tests were utilized to preserve the validity of statistical inferences (Gibbons & Chakraborti, 2011).

To examine bivariate associations, Spearman’s rank-order correlation was used, which is well-suited for non-normally distributed data (Siegel & Castellan, 1988). For variables with statistically significant relationships, the Kruskal–Wallis test was conducted to assess differences between groups, followed by the Dwass–Steel–Critchlow–Fligner (DSCF) test for post-hoc pairwise comparisons.

Evidence of Learning Acceleration

Novi Virtual provides access to learning that would otherwise not be possible. For students from within Novi Community School District, they often join Novi Virtual because they may be traveling abroad for extended periods of time, experiencing medical challenges, or would otherwise be prevented from attending school in person, resulting in significant absence. For students coming from Partner Districts, many have been disengaged from school and may be experiencing chronic absenteeism, behavior challenges, or expulsion. **Since this model provides access to learning that otherwise would not be available, Novi Virtual is accelerating learning through sheer access.** Increased attendance rates for students who would otherwise not be attending school is an important factor to consider.

Attendance

Table H2. Novi Virtual’s Average GPAs, Attendance, and Chronic Absenteeism Rates

Demographics	Novi Virtual Total Population (n=160)	Novi Community School District Student (n=114)	Partner District Student (n=45)	Novi Community School District Total Population ³² (n=6,775)
GPA	2.86 (n=155)	3.22 (n=114)	1.89 (n=41)	Not Reported
Attendance Across Courses	81.6% (n=160)	91.5% (n=114)	80.5% (n=45)	92% (n=6,889) ³³
Chronically Absent	33.75% (n=54)	23.7% (n=27)	60.0% (n=27)	18.8% (n=1,298) ³⁴

32. Michigan Department of Education, n.d.

33. 2023-2024 School Year

34. 2023-2024 School Year

Students who attend Novi Community School District engage with similar curriculum and high expectations as provided during in-person instruction. For Partner District students, this often requires a rapid adjustment to higher rigor while also joining a virtual environment—often not by their own choice. Many of these students did not find success in their home district's model, offering additional context as to why their average GPAs are lower.

Through Novi Virtual, both Novi Community School District and Partner District students engage in learning that they would not otherwise be possible. This is an important factor to consider when observing attendance rates. Across both groups of students, attendance skews positively.

Figure H2. Distribution of Attendance Rates by Novi Community School District and Partner District Students

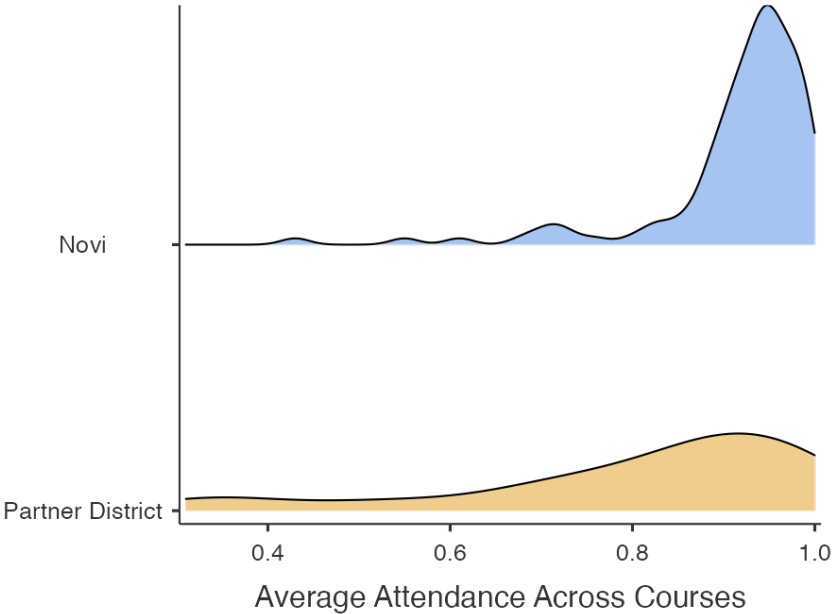
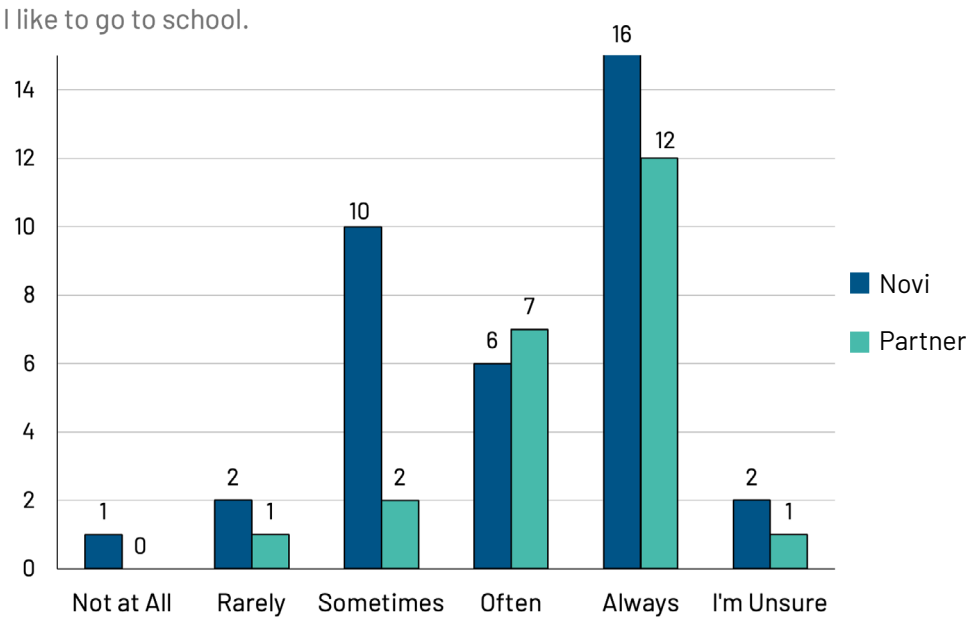


Figure H3. Novi and Partner District Student's Satisfaction with School



Attendance data highlight the model's success in re-engaging learners. Partner District students, who may have previously experienced chronic absenteeism, reported significantly improved attitudes toward school. For example, 82.6% of Partner District students said they often or always like to go to school, compared to 62.8% of Novi Community School District students overall. Similarly, 86.7% of Partner District students said they feel comfortable at school, matching or exceeding Novi Community School District student averages. These measures suggest that Novi Virtual not only re-engages learners but also creates conditions for belonging.

Course Grades

Grades also serve as an important factor in understanding learning acceleration for students attending Novi Virtual since students do not take other benchmark assessments such as NWEA MAP or iReady. In ELA, 66.2% of students achieved an A or B and 49.6% of students did in Math. While students from Novi Community District on average, had higher grades, these students have historically been exposed to the system's rigorous curricula, high expectations, and methods for teaching. In contrast, Partner District students come to Novi Virtual after already not finding success in their home district, which often has different curriculum, expectations, and support. As a result, the 29.5% of partner students earning an A or B in ELA and 23.8% earning the same in Math demonstrates significant progress and opportunity for students to succeed academically.

In Michigan, virtual programs report course pass rates, an important benchmark for understanding how students demonstrate progress in virtual learning environments. Substantial percentages of both Novi Community District and Partner District high school students passed their core courses. Both groups of learners outperformed state averages for virtual learners from alternative education and general education environments, serving as evidence that these students are experiencing learning acceleration.

Table H3. Pass Rates by Course and Enrollment

	School Level	Novi Community District Students (SY24-25)	Partner District (SY24-25)	State of Michigan: Alternative Education Models (SY23-24) ^{35,36}	State of Michigan: General Education (SY23-24) ^{35,36}
English Language Arts	Middle School ³⁷	42.9% (n=7)	41.7% (n=24)	78.0% (n=3,000)	72.0% (n=22,000)
	High School	95.0% (n=100)	85.0% (n=20)	48.0% (n=32,000)	67.0% (n=34,000)
Mathematics	Middle School ³⁷	71.4% (n=7)	68.0% (n=25)	75.0% (n=3,000)	70.0% (n=23,000)
	High School	96.6% (n=78)	76.5% (n=17)	45.0% (n=31,000)	68.0% (n=33,000)

35. The most recent publicly available data is from the 2023-2024 school year.

36. Michigan Virtual Learning Research Institute, n.d.

37. Middle School Data from the State of Michigan includes some elementary school student data as well.

Social Studies	Middle School ³⁷	33.3% (n=6)	56.0% (n=25)	78.0% (n=3,000)	73.0% (n=22,000)
	High School	98.46% (n=65)	76.47% (n=17)	48% (n=29,000)	72% (n=35,000)
Science	Middle School ³⁷	42.86% (n=7)	64% (n=25)	76% (n=3,000)	74% (n=23,000)
	High School	97.14% (n=70)	87.5% (n=16)	46% (n=29,000)	70% (n=30,000)

When examining the distribution of grades in ELA and Math, Novi Community School District students outperformed Partner District students. However, as discussed earlier, the majority of students passed their courses, a feat that would most likely not have been possible had these students been exited from school entirely.

Figure H4. Grade Trends for Novi Community School District and Partner District Students in ELA

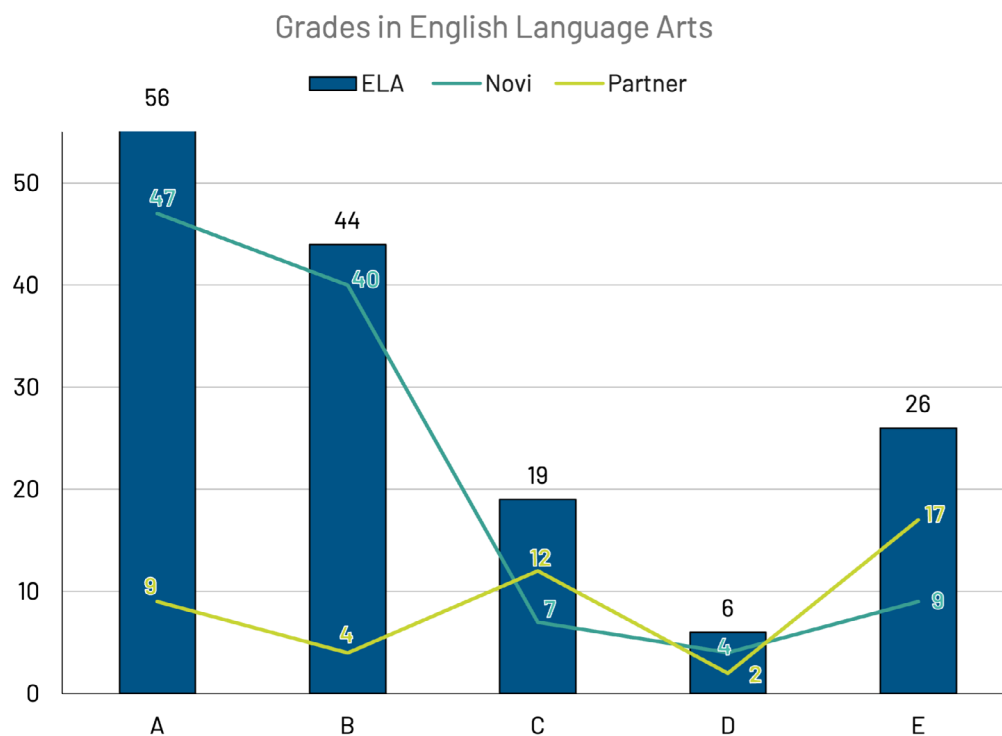


Figure H5. Grade Trends for Novi Community School District and Partner District Students in Math

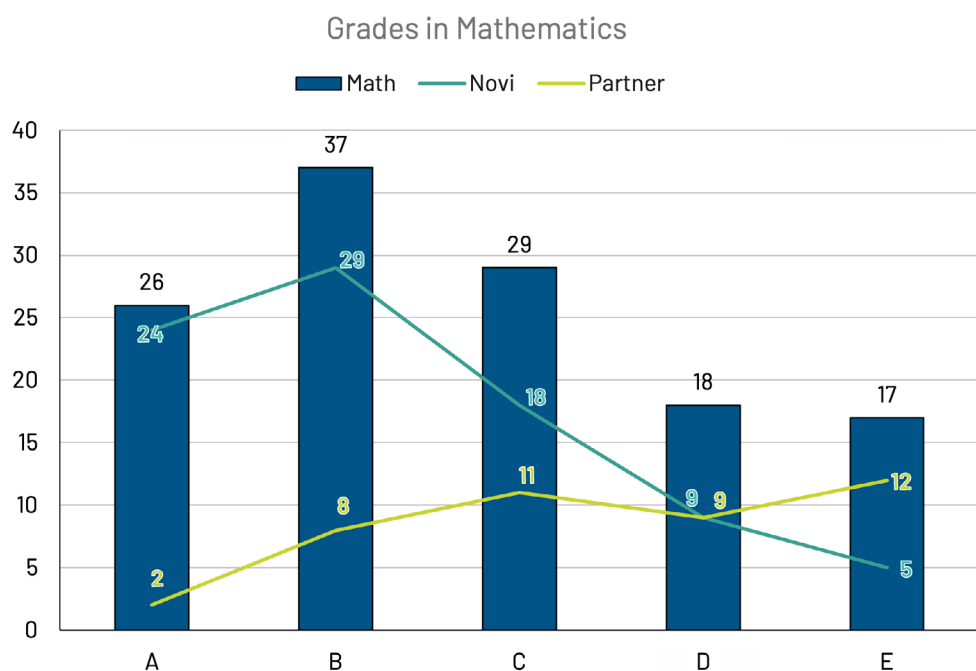


Table 4 on the following page shows the statistical relationships between student partner status, days enrolled, attendance, and grades using Spearman's rho—a nonparametric alternative to Pearson's correlation. Since we had small sample sizes, and the data was not normally distributed, this was a more appropriate statistical test to understand relationships. Using Spearman's correlation, we were able to identify significant relationships ($p < .001$) across the number of days enrolled, attendance, and course grades. Partner District students were statistically more likely to be enrolled for fewer days and have lower attendance, whereas Novi Community School District students were statistically more likely to have higher grades across subjects. Pairwise analyses confirmed these findings across all variables (W ranging from -8.08 to 7.75, $p < .001$). Likewise, the longer students were enrolled, the more likely they were to have higher attendance and higher grades.

Table H4. Spearman's Correlation of Novi Community School District and Partner District Students Days Enrolled, Attendance, and Grades

		Novi Community School District vs Partner District	Days Enrolled	Average Attendance Across Courses	ELA Grade	Math Grade	Social Studies Grade	Science Grade
Novi Community School District vs Partner District	Spearman's rho	—						
	df	—						
	p-value	—						
	N	—						
Number of Days Enrolled	Spearman's rho	-0.454***	—					
	df	157	—					
	p-value	<.001	—					
	N	159	—					
Average Attendance Across Courses	Spearman's rho	-0.294***	0.468***	—				
	df	157	157	—				
	p-value	<.001	<.001	—				
	N	159	159	—				
ELA Grade	Spearman's rho	0.376***	-0.309***	-0.538***	—			
	df	151	151	151	—			
	p-value	<.001	<.001	<.001	—			
	N	153	153	153	—			
Math Grade	Spearman's rho	0.390***	-0.320***	-0.508***	0.616***	—		
	df	127	127	127	124	—		
	p-value	<.001	<.001	<.001	<.001	—		
	N	129	129	129	126	—		

Social Studies Grade	Spearman's rho	0.518***	-0.412***	-0.551***	0.793***	0.679***	—	
	df	111	111	111	110	94	—	
	p-value	<.001	<.001	<.001	<.001	<.001	—	
	N	113	113	113	112	96	—	
Science Grade	Spearman's rho	0.451***	-0.406***	-0.557***	0.768***	0.702***	0.831***	—
	df	117	117	117	115	103	91	—
	p-value	<.001	<.001	<.001	<.001	<.001	<.001	—
	N	119	119	119	117	105	93	—

The same held true when analyzing the same correlations for only the Partner District student sample, the longer a Partner District student attended Novi Virtual, the higher their attendance and grades ($\rho = -.538$ to $.831$, $p < .001$). This suggests that the model is working, but it takes time for students to see progress.

Table H5. Spearman's Correlation of Partner District Students Days Enrolled, Attendance, and Grades

		Days Enrolled	Average Attendance Across Courses	ELA Grade	Math Grade	Social Studies Grade	Science Grade
Number of Days Enrolled	Spearman's rho	—					
	df	—					
	p-value	—					
	N	—					
Average Attendance Across Courses	Spearman's rho	0.468***	—				
	df	157	—				
	p-value	<.001	—				
	N	159	—				
ELA Grade	Spearman's rho	-0.309***	-0.538***	—			
	df	151	151	—			
	p-value	<.001	<.001	—			
	N	153	153	—			
Math Grade	Spearman's rho	-0.320***	-0.508***	0.616***	—		
	df	127	127	124	—		
	p-value	<.001	<.001	<.001	—		
	N	129	129	126	—		
Social Studies Grade	Spearman's rho	-0.412***	-0.551***	0.793***	0.679***	—	
	df	111	111	110	94	—	
	p-value	<.001	<.001	<.001	<.001	—	
	N	113	113	112	96	—	
Science Grade	Spearman's rho	-0.406***	-0.557***	0.768***	0.702***	0.831***	—
	df	117	117	115	103	91	—
	p-value	<.001	<.001	<.001	<.001	<.001	—
	N	119	119	117	105	93	—

Evidence of High Quality

To examine how students and teachers experience the drivers of high quality VHL (effective pedagogy, strong relationships, a foundation for self-directed learning, and technology), fall and spring surveys were administered. Results confirm that students perceive the program as rigorous, relational, and supportive of self-directed learning, and that these experiences are significantly linked to measurable academic outcomes such as GPA and attendance.

Table H6. Quality Driver Student Survey Results

Quality Driver	Survey Item	Percentage of Students who Indicated Often or Always	
		Fall (n=39)	Spring (n=60)
Foundation for Self-Directed Learning	I know what is expected of me to be successful in the program.	92.3%	88.3%
Effective Pedagogy	I feel connected to what we are learning in class.	84.6%	65.0%
	I take part in activities that meet my needs and help me to learn.	69.2%	75.0%
	My teacher provides clear and helpful feedback.	60.5%	81.7%
Strong Relationships	I set goals for my learning, either on my own or with the help of a teacher.	41.7%	66.7%
	I am able to provide suggestions and feedback on how to improve learning in my class.	53.8%	56.9%

Foundation for Self-Directed Learning

Students also reported clarity in expectations, a practice Novi teachers promote universally through clearly structured classrooms, with 88.3% saying they often or always knew what was expected to be successful. This strong foundation for self-directed learning was statistically associated with GPA ($p = .280$, $p = .03$).

"I think my students have developed better time management and communication skills [since joining this program]." - Novi Virtual Teacher

Effective Pedagogy

In this program, students engage with the same high-quality curriculum that is taught in Novi Community School District, allowing for seamless transitions between in-person and virtual learning. In the spring, 65.0% of students said they often or always felt connected to what they were learning, and 75.0% said class activities met their needs and helped them learn. These survey items were positively correlated with GPA (p values ranging from .318-.370, $p < .013$), showing that when students perceive instruction as responsive and aligned to their needs, they perform better academically.

"Being a part of Novi Virtual since my sophomore year has really changed how I learn—for the better. It's given me more control over my schedule, which has helped reduce a lot of the stress and anxiety I used to feel in traditional school. I've been able to go at my own pace, focus better, and stay on top of my work without feeling overwhelmed. Overall, it's been a great experience, and I'm just really happy and proud to finally be graduating." - Novi Virtual 12th Grade Partner Student

Strong Relationships

At Novi Virtual, the program facilitates personalized onboarding for students to support their transition and help them build connections. In the fall, 41.7% of students reported setting goals with teachers often or always, which grew to 66.7% by spring. Similarly, more than half (56.9%) said they often or always had opportunities to provide suggestions and feedback on learning. These items were correlated with GPA ($p = .297-.314$, $p < .021$) and scored higher by partner students who had been previously disengaged by their home district model ($p = -.442 - -.310$, $p < .018$), confirming that when students feel supported and heard, they are more likely to succeed—important evidence for both in-person and virtual learning.

Conclusion

Novi Virtual demonstrates that high-quality virtual learning can serve as both a rigorous academic option and a restorative intervention for previously disengaged students. Students report clarity of expectations, meaningful teacher feedback, and growing opportunities to set goals and provide input. Partner students, many of whom entered with histories of absenteeism or disengagement, report stronger connections to school and higher levels of comfort and belonging.

Together, these findings position Novi Virtual as a model of high-quality, flexible learning that accelerates achievement by restoring engagement and cultivating self-directed learners.

Appendix I: St. Vrain Valley School District AGILE

Model Snapshot: St. Vrain Valley School District AGILE- Longmont, Colorado

St. Vrain's Advanced Global Interactive Learning Environments (AGILE) Program is a hybrid learning model, serving students who virtually join classes in other schools within the district while physically attending their home school. Students in these satellite locations gather in person with peers while connecting virtually to a central classroom, allowing for both local collaboration and real-time engagement with teachers and students across the district.

Key Findings:

- **Expanding access:** By leveraging simple tools, such as a quiet space, a computer or tablet, and Cisco Webex conferencing hardware, students from across the 411 square mile system – plus students from rural districts across Colorado – can access specialized courses they otherwise would not be able to access such as AP Art History, Cybersecurity, and Mandarin.
- **High academic performance:** Students who participate in AGILE outperform their peers on GPA, PSAT, and SAT. They also have fewer reported behavioral incidents.
- **Serving gifted learners:** While only 8.2% of students districtwide are formally identified as gifted, nearly one in three AGILE students (28.1%) hold this designation. AGILE demonstrates its ability to accelerate learning for students who need advanced or specialized coursework opportunities.
- **Pedagogy and outcomes:** Students reported high levels of instructional quality, with 74.7% saying they often or always felt connected to what they were learning, and 79.7% saying that class activities met their needs. These perceptions were significantly correlated with PSAT scores ($\rho = .516$, $p < .008$), underscoring that AGILE's emphasis on relevant, rigorous pedagogy translates directly into measurable academic success.

St. Vrain's AGILE program expands course access to students across their 411 square mile district as well as from other rural districts across Colorado through a **hybrid** learning model. Students join classes virtually in a different building while physically attending their home school. During class time, students in the satellite schools learn in-person with a group of their peers, allowing for both in-person collaboration and virtual engagement. This model centers on the needs of students who want access to a large catalog of high-quality coursework while staying engaged within their local school communities. This highly transferable model sits within a larger ecosystem of innovative access to college and career activities, including a robust Pathways in Technology Early College High School (P-TECH), and programs housed at the Innovation Center of St. Vrain where students study aviation (including building and piloting planes), lead local water safety efforts with underwater robotics, and learn neuroscience through hands-on experiments such as conducting surgery on cockroaches.

Table 11. Student Demographics of AGILE Students and Non-AGILE Students in St. Vrain Valley School District

Demographics	AGILE Students (n=498)	Non-AGILE Students (n=14,764)	St. Vrain Valley School District ³⁸ (n=32,414)
Black or African American	0.8%	1.0%	0.1%
White	71.9%	61.1%	59.7%
Asian	7.2%	3.2%	3.5%
Latine	16.5%	31.0%	31.4%
Female	48.8%	48.8%	48.9%
Male	51.2%	51.2%	51.1%
Identified as Gifted	28.1%	Not Reported	8.2%

Model Practices

To understand and evaluate the practices within the St. Vrain Valley School District's AGILE model, we used the [quality drivers of high quality virtual and hybrid learning](#)—effective pedagogy, strong relationships, foundation for self-directed learning, and technology—as the underlying theoretical framework. The AGILE program offers course access through hybrid courses taught by highly-qualified educators in often hard-to-staff subjects, leveraging technology to deliver an educational experience directly aligned to the quality drivers. **Students from across the school system and other rural districts in Colorado can join classes that would otherwise be unavailable by leveraging a quiet space in their building, a computer or tablet, and Cisco Webex conferencing hardware to video connect to another classroom with in-person students.** In this model, students benefit from learning from students and teachers from different schools while still attending their home school.

38. Colorado Department of Education, n.d.

Figure 11. St. Vrain's AGILE Logic Model of Learning Acceleration

Inputs	Practices	Outputs	Outcomes
7th-12th grade students who want expanded course offerings accessible in a hybrid format	Effective Pedagogy ● Experience specialized courses taught by teachers in other schools. Strong Relationships ● Collaborate in-person and virtually with peers. Foundation for Self-Directed Learning ● Create learning playlists to customize their learning in their subjects of interest. ● Engage in self-paced learning in several courses. Technology ● Utilize Cisco technologies and hardware to seamlessly interact and engage with an in-person class, virtually.	Engagement ↓ Attendance ↓ Participation ↓ Work Completion ★ Active Learning	Traditional Measures ● Credits Earned ● PSAT/SAT Scores ● GPA Broader Measures ● Attendance

Data Collection and Analysis

During the 2024-2025 school year, FullScale administered a fall and spring survey for students and teachers to understand the extent to which the high-quality drivers of virtual and hybrid learning were present. St. Vrain Valley School District provided student-level data for enrolled students, including demographic information, GPA, credits earned, PSAT scores, SAT scores, attendance, and attendance. The FullScale research team also observed the program in April 2025. In addition, St. Vrain Valley Schools shared aggregate data for non-AGILE students from the district to support contextualization of student performance.

The FullScale research team de-identified all of the data and then analyzed it using descriptive statistics. Analyses of skewness, kurtosis, distribution, and normality supported an initial understanding of the data and were used to determine appropriate subsequent tests that would identify relationships between variables.

This approach is consistent with best practices for exploratory data analysis in educational research (Tabachnick & Fidell, 2013). Given that the data did not meet assumptions of normality, nonparametric tests were utilized to preserve the validity of statistical inferences (Gibbons & Chakraborti, 2011).

To examine bivariate associations, Spearman’s rank-order correlation was used, which is well-suited for non-normally distributed data (Siegel & Castellan, 1988). For variables with statistically significant relationships, the Kruskal-Wallis test was conducted to assess differences between groups, followed by the Dwass-Steel-Critchlow-Fligner (DSCF) test for post-hoc pairwise comparisons.

Evidence of Learning Acceleration

Across all traditional and broader relevant measures, students who participated in the AGILE program outperformed their peers. While scores across the district are high, on average, AGILE’s model allows for motivated students to customize their learning by selecting courses that may not otherwise be available to them at their home school. This expanded access to high-quality learning affords an important opportunity for learning acceleration, producing evidence that it works.

Table 12. Academic Outcomes for AGILE Students and Non-AGILE Students

Outcomes	AGILE Students (n=498)	Non-AGILE Students (n=14,764)
GPA	3.6 (n=475)	3.01 (n=14,764)
Attendance Rate	91.3% (n=484)	91.9% (n=14,764)
PSAT 9	1125.8 (n=26)	923 (n=2,214)
PSAT 10	1089.4 (n=63)	948.5 (n=2,040)
SAT 11	1175.6 (n=39)	1015.9 (n=2,202)
Average Rate of Behavior Incidents	4%	16%

Differences in Outcomes between Latine and White Students

While the majority of students in the AGILE program tend to be high achieving, there are disparities in performance between Latine and white students in attendance, GPA, PSAT, and SAT. These differences are demonstrated in Table I3, with negative W values indicating that Latine students were more likely to have lower results compared to White students, with p-values confirming their level of significance. However, there was not a significant difference between racial groups in the number of credits earned in the year ($W = .946$, $p = .910$), signaling that while performance may not yet be consistent across student demographics, the AGILE program is equitably providing access to course credits - an important feature of their model.

Table I3. Dwass-Steel-Critchlow-Figner Pairwise Comparisons of Latine and White Students Across Academic Outcomes

Outcomes	W	p
Attendance	-7.146	<.001
BOY GPA	-10.628	<.001
EOY GPA	-10.906	<.001
Total Credits Earned	.946	.910
2025 PSAT	-3.7849	.037

Course Enrollment

During the 2024-2025 school year, 322 AGILE students enrolled in 4,775 courses across 570 unique offerings spanning 19 subject areas. While these class counts account for all of the courses they enrolled in, whether AGILE designated or not, the breadth of course offerings speaks to the opportunity the program is able to unlock. Some of the specialized options available include Intro to Cybersecurity, AP Art History, Introduction to Aeronautics, AP Calculus B/C, Intro to Criminal Justice, Business Law, and Mandarin Chinese - courses that would rarely be available in smaller, rural high schools.

Table 14. Course Offerings and Total Enrollments for AGILE Students

Subject Area	Number of Courses Offered	Total Enrollments	Average Grade*	Pass Rate	Average Credits Earned per Course
Agriculture and Natural Resources	1	1	1	100.0%	.50
Business and Marketing	13	58	1.27	98.3%	.50
Communication and Audio/ Visual Technology	14	38	1.29	100.0%	.52
Computer and Information Sciences	26	316	1.52	98.4%	.49
Engineering and Technology	16	41	1.22	100.0%	.50
English Language and Literature	56	621	1.64	98.9%	.49
Fine and Performing Arts	90	357	1.50	98.9%	.49
Health Care Sciences	4	6	1.67	100.0%	.92
Hospitality and Tourism	2	2	1.5	100.0%	1.00
Human Services	5	19	1.1	100.0%	.50
Life and Physical Sciences	68	555	1.80	98.9%	.49
Manufacturing	2	2	4	50.0%	.50
Mathematics	54	616	1.86	97.7%	.49
Miscellaneous (Including Advisory and AP Seminar)	82	893	1.54	98.4%	.29
Physical, Health, and Safety Education	31	288	1.55	97.2%	.44
Public, Protective, and Government Services	4	27	2.59	92.6%	.48
Social Sciences	65	609	1.76	97.9%	.49
Transportation, Distribution, and Logistics	1	1	1.00	100.0%	1.00
World Languages and Literature	36	325	1.53	96.9%	.48
Total Count or Average	570	4,775	1.66	96.0%	.45

*Grades were originally reported as A, B, C, D, and F and were converted to numerical values of 1, 2, 3, 4, and 5 respectively.

Serving Gifted Learners with Unique Needs

AGILE plays a critical role in meeting the needs of gifted students from rural communities across St. Vrain Valley School District. **While only 8.2% of students districtwide formally identified as gifted, nearly one in three AGILE students (28.1%) hold this designation.** This concentration reflects how the program’s flexible, hybrid model creates access to specialized and advanced coursework rarely available in students’ home schools while allowing gifted students to remain connected to their local communities.

Academic outcomes confirm that gifted students in AGILE are not only accessing more rigorous content but also outperforming their peers across nearly every measured outcome. At the end of the year, gifted AGILE students reported a mean GPA of 4.19 compared to 3.34 for their general education peers. On standardized assessments, gifted students achieved a mean SAT score of 1362 versus 1095 and a PSAT mean of 1227 compared to 1014.

As shown in Table I6, these differences are not only descriptive but statistically significant. Kruskal-Wallis tests confirmed significant large effect sizes for both PSAT ($\chi^2 = 38.5$, $df = 1$, $p < .001$, $\epsilon^2 = 0.27$) and SAT ($\chi^2 = 21.7$, $df = 1$, $p < .001$, $\epsilon^2 = .36$). These findings suggest that the AGILE model is not simply attracting gifted students but is enabling them to thrive academically at rates far above comparison peers, and, importantly, this is achieved without gifted students earning disproportionately more total credits than others, ensuring equitable access to learning opportunities ($\chi^2 = 3.09$, $df = 1$, $p = .079$, $\epsilon^2 = 0.0118$)

By serving a higher proportion of gifted learners, ensuring access to advanced coursework, and documenting statistically significant performance advantages, **AGILE demonstrates its ability to accelerate learning for students who need specialized coursework opportunities while simultaneously helping them to thrive.** This outcome reinforces the program’s role as a scalable equity lever, expanding advanced opportunities to students who might otherwise lack them.

Table I5. Mean Student Outcomes by Gifted Identification Status

Outcomes	Gifted Identified Students (n=140)	General Education Students (n=355)
Attendance Rate	94.2	90.2
EOY GPA	4.19	3.34
BOY Credits Earned	22.4	18.9
EOY Credits Earned	24.6	21.9
Total Credits Earned in SY24-25	3.66	3
PSAT	1227	1014
SAT	1362	1095

Table 16. Kruskal-Wallis Test of Student Outcomes Grouped by Gifted Identification Status

	χ^2	df	p	ϵ^2
Attendance (September - December)	21.4	1	<.001	0.0434
Attendance (January - May)	18.6	1	<.001	0.0386
BOY GPA	142.6	1	<.001	0.2952
EOY GPA	122.6	1	<.001	0.2586
BOY Credits Earned	16.6	1	<.001	0.0591
EOY Credits Earned	18.5	1	.079	0.0389
Total Credits Earned	3.09	1	<.001	.0118
2025 SAT	21.7	1	<.001	0.3623
2025 PSAT	38.5	1	<.001	0.2676
2024 SAT	116.7	1	<.001	0.5352
2024 PSAT	170.3	1	<.001	0.4267

Evidence of High Quality

To examine how students and teachers experience the [drivers of high quality VHL](#) (effective pedagogy, strong relationships, a foundation for self-directed learning, and technology), fall and spring surveys were administered. Results show that AGILE students consistently report strong clarity of expectations, meaningful feedback, and growing opportunities for relationships and agency. Importantly, these perceptions are statistically linked to academic outcomes such as GPA, credits earned, and PSAT/SAT performance.

Table 17. Quality Driver Student Survey Results

Quality Driver	Survey Item	Percentage of Students who Indicated Often or Always	
		Fall (n=73)	Spring (n=75)
Foundation for Self-Directed Learning	I know what is expected of me to be successful in the program.	94.5%	97.3%

Effective Pedagogy	I feel connected to what we are learning in class.	84.5%	74.7%
	I take part in activities that meet my needs and help me to learn.	76.5%	79.7%
	My teacher provides clear and helpful feedback.	76.7%	87.0%
Strong Relationships	I set goals for my learning, either on my own or with the help of a teacher.	49.3%	65.3% ³⁹
	I am able to provide suggestions and feedback on how to improve learning in my class.	68.6%	65.6%

Foundation for Self-Directed Learning

In the AGILE program, students often need to self-direct their learning. By spring, 97.3% of students said they often or always knew what was expected to succeed, up from 94.5% in fall. This item correlated positively with PSAT scores ($\rho = .427$, $p = .033$).

"I think, more than anything, they have learned how to take control of their own learning. I, along with my students' instructional coach, can support our students as much as possible. However, in the end it is really on the student to learn the content and express their understanding of what they have come to learn and know. That has always been the case whether in a traditional classroom or a hybrid environment, but I think this particular learning model expresses that need for the student to take control of their learning on a deeper level."
- AGILE Teacher

Effective Pedagogy

The AGILE program allows students to take specialized courses that may not otherwise be available to them. In the spring, 74.7% said they often or always felt connected to what they were learning, while 79.7% said activities met their needs and helped them learn, which was also correlated with PSAT scores ($\rho = .516$, $p < .008$). The most notable increase was in feedback, with 87.0% reporting their teachers provided clear and helpful feedback, up from 76.7% in the fall.

"Being part of AGILE has changed how I learn because I know that we have the ability to learn with people from different schools and have the ability to hear questions we may have never thought of." - AGILE 9th Grade Student

39. The sizable increase in students selecting often or always on this variable in the Spring may be due to the prompt adding "either on my own" whereas in the fall, the prompt only asked about setting goals with a teacher.

Strong Relationships

Relationships also strengthened during the year. In fall, 49.3% of students reported often or always setting goals with teachers, which increased to 65.3% in spring. Similarly, two-thirds reported opportunities to provide feedback to improve their learning (68.6% in fall, 65.6% in spring).

These findings provide evidence that AGILE students experience high-quality learning aligned to effective pedagogy, strong relationships, and self-directed learning.

Conclusion

The AGILE program demonstrates how hybrid models can serve rural students well by expanding access to high-quality coursework, through scalable and cost-effective staffing strategies, while driving measurable acceleration. Students report clear expectations, rigorous instruction, and strong relational support, with many of these perceptions being statistically correlated with PSAT scores. Outcomes data confirm that AGILE students outperform peers academically, access a broader range of coursework, and show stronger behavior outcomes. Importantly, the model also meets the needs of gifted learners, offering advanced options rarely available in rural or resource-constrained schools.

Together, these findings position AGILE as a scalable, rigorous, and equity-driven model of hybrid learning acceleration from which other districts can learn.



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