The Power of Predictive Analytics

What is predictive analytics?

Predictive Analytics: How it Works

Historical Data

Machine Learning

Customized Predictive Models (by district and gradespan)

Predictive Analytics – technology that learns from experience (data) to predict the future behavior of individuals in order to drive better decisions.

The Cost of an Incomplete High School Education

$292K
Cost to Taxpayer over Course of Dropout's Life

$8B
Annual Crime-Related Savings/Revenue with a 5% Male Graduation Increase

14.3%
Dropout Unemployment

(Center for Labor Market Studies; Alliance for Excellent Education; U.S. Bureau of Labor Statistics)

Economic Benefits of a 90% National High School Graduation Rate

$3.1 B
Additional Annual Earnings

$5.7B
Economic Growth

$664 M
Annual Tax Increase

(Alliance for Excellent Education)

Threshold Models

Traditional Early Warning Systems **Have Not Improved Outcomes**

Reactive Identification to At-Risk Students

Identifies at-risk students using limited risk indicators in isolation.
Risk is defined by what has already happened.

One-Size-Fits-All Risk Indicators Apply to All Students

Based on national data, risk signs of a second grader in a rural district are the same risk signs as a ninth grader in an urban district.

More High Schools Found to Have Low Graduation Rates

(EdWeek)

Predictive Analytics

On-Time Graduation & Postsecondary Readiness

State-of-the-Art Predictive Analytics

Draws upon many data points across domains of performance, attendance, and behavior.

Customized to Districts & Grade Levels

Looks at actual data across all domains, and fits the best predictive models that would have predicted on-time graduation and postsecondary success. Models are applied retroactively to current students.

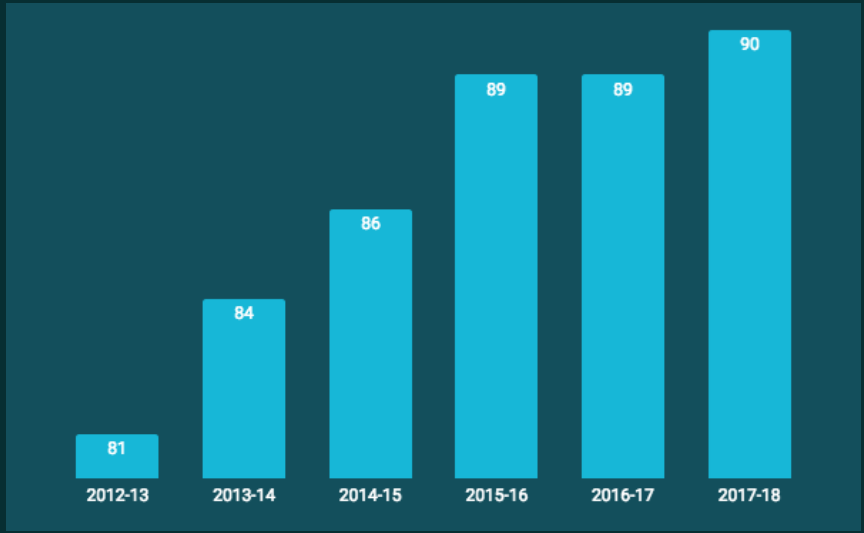
Founded in 1946 *1800+ Employees*

AIR®

Case Study: West Virginia

Identifying at-risk students & implementing interventions at earlier ages

Graduation Rates



Results from statewide efforts to identify, connect, and monitor at-risk students early and accurately

Recognized as a top 5 state for improved grad rates

9%
Grad Rate Improvement

~24,000
Additional Graduates

~$283M
Per Pupil Savings

THE BRIGHTBYTES TEAM

Jann Arnold

Director of Partnerships

Professional Experience

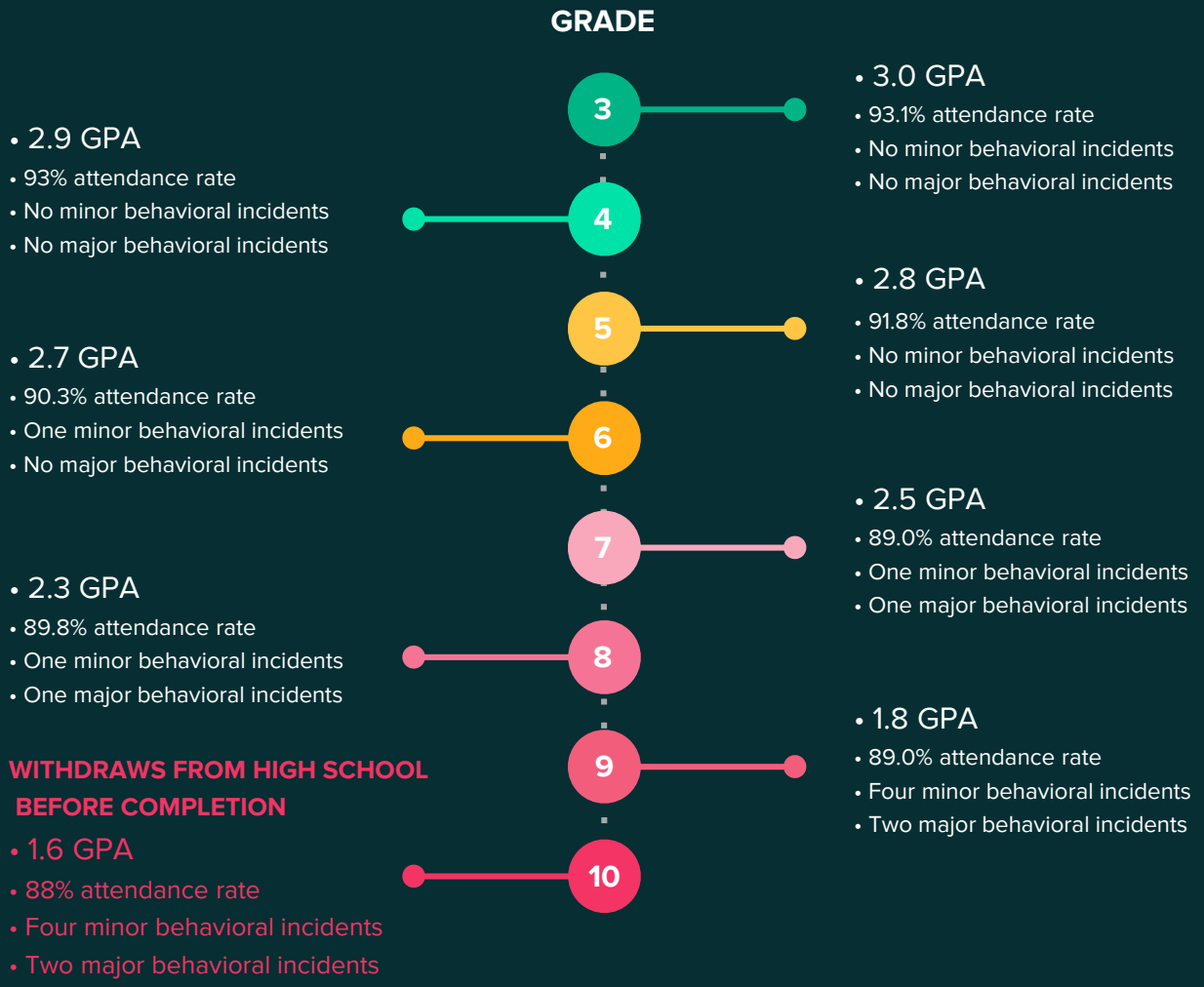
- School Finance Officer, Arkansas
- Governmental Auditor
- Certified Public Accountant

Professional Service

- AAEA Legislative Committee
- SASBO and AASBO Board
- US DoE Regional Technical Advisory Committee

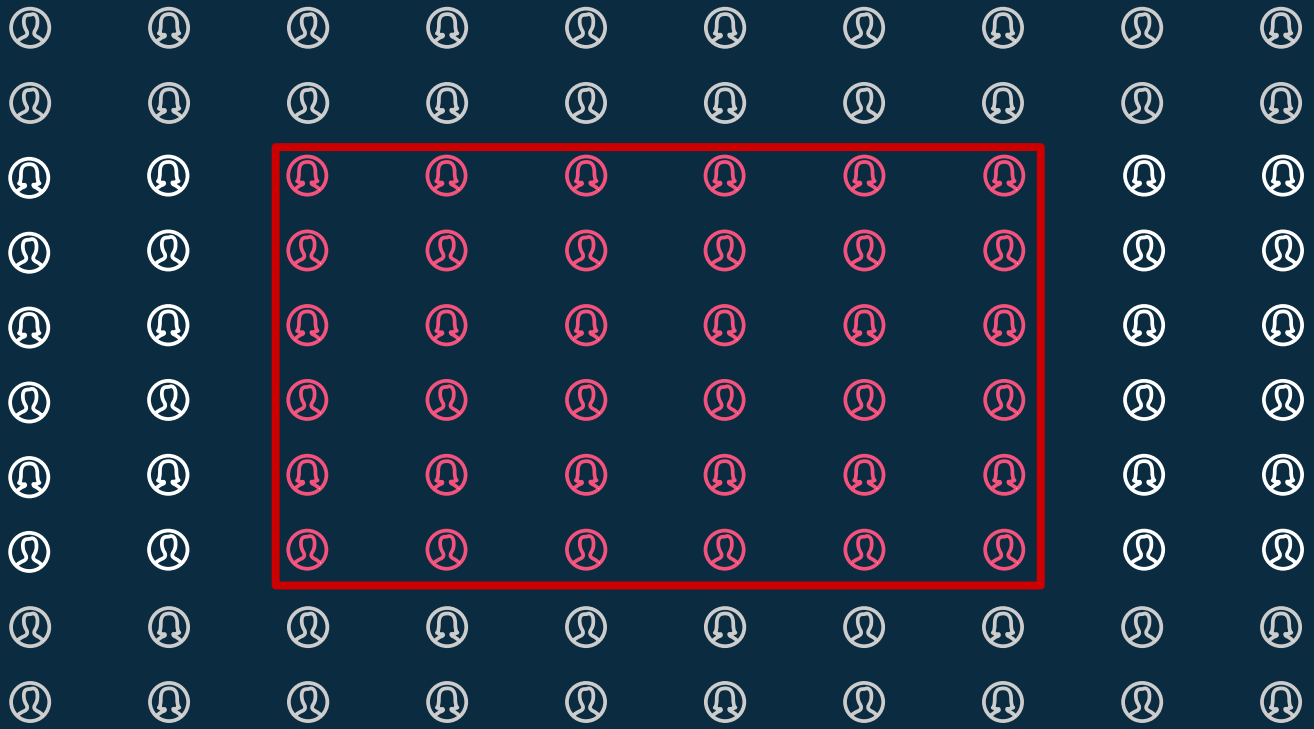
An Incomplete High School Journey: Summative Data

The data contained in this figure is based on analyses of 42,571 students and represents the profiles of students, at each grade level, who eventually did not graduate high school.

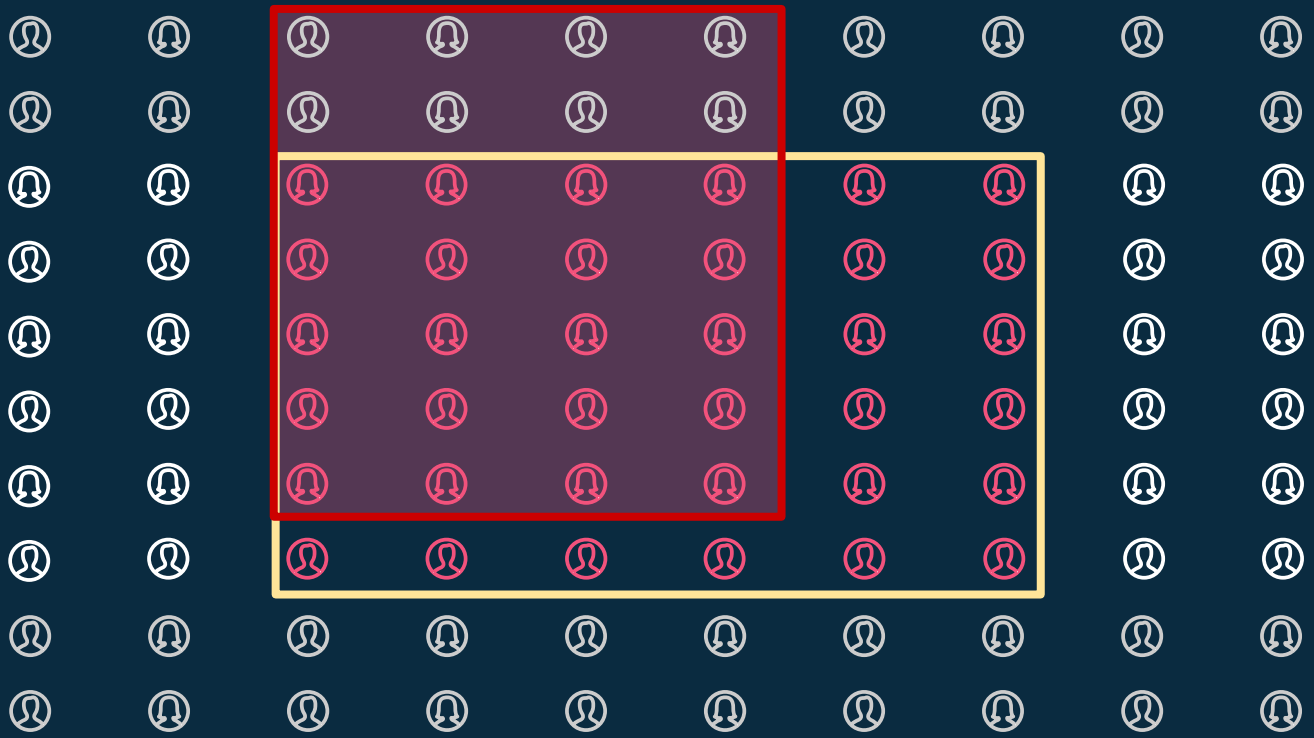


In a class of 100 ninth graders...

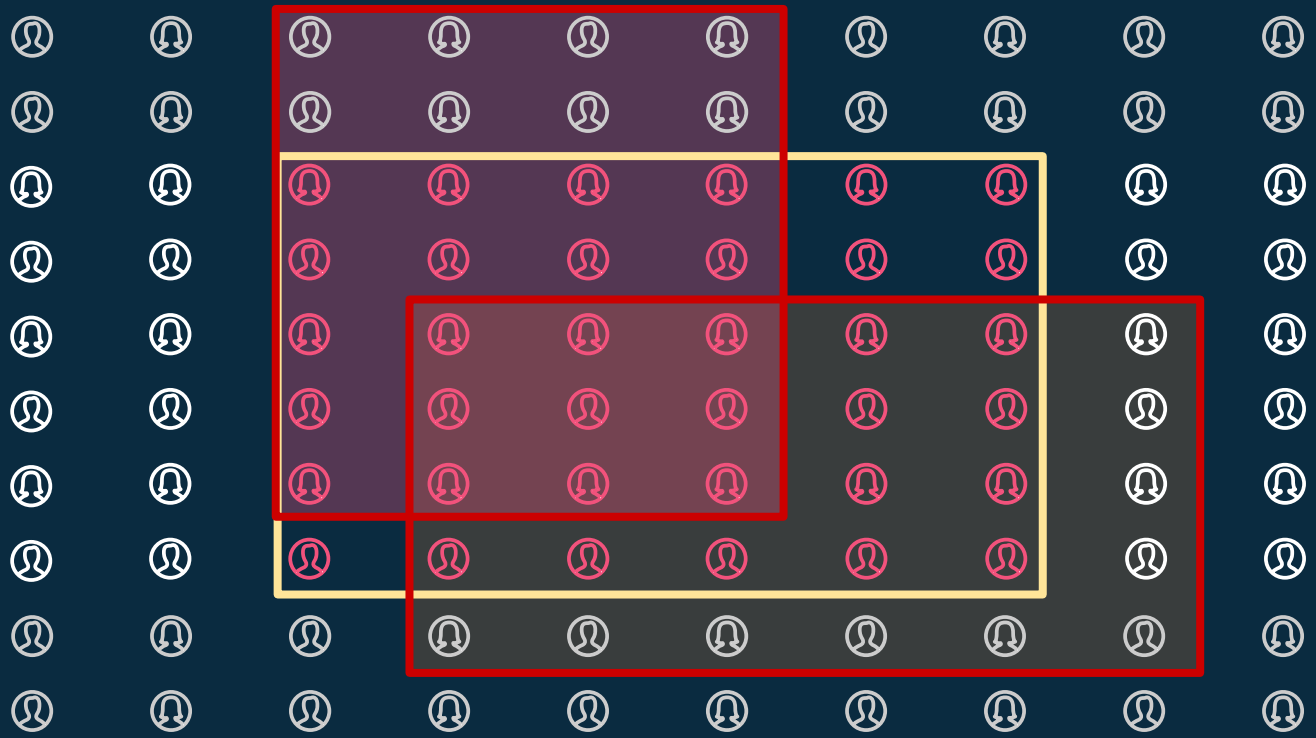
36 students are off track for graduation



Identification with a Single Indicator



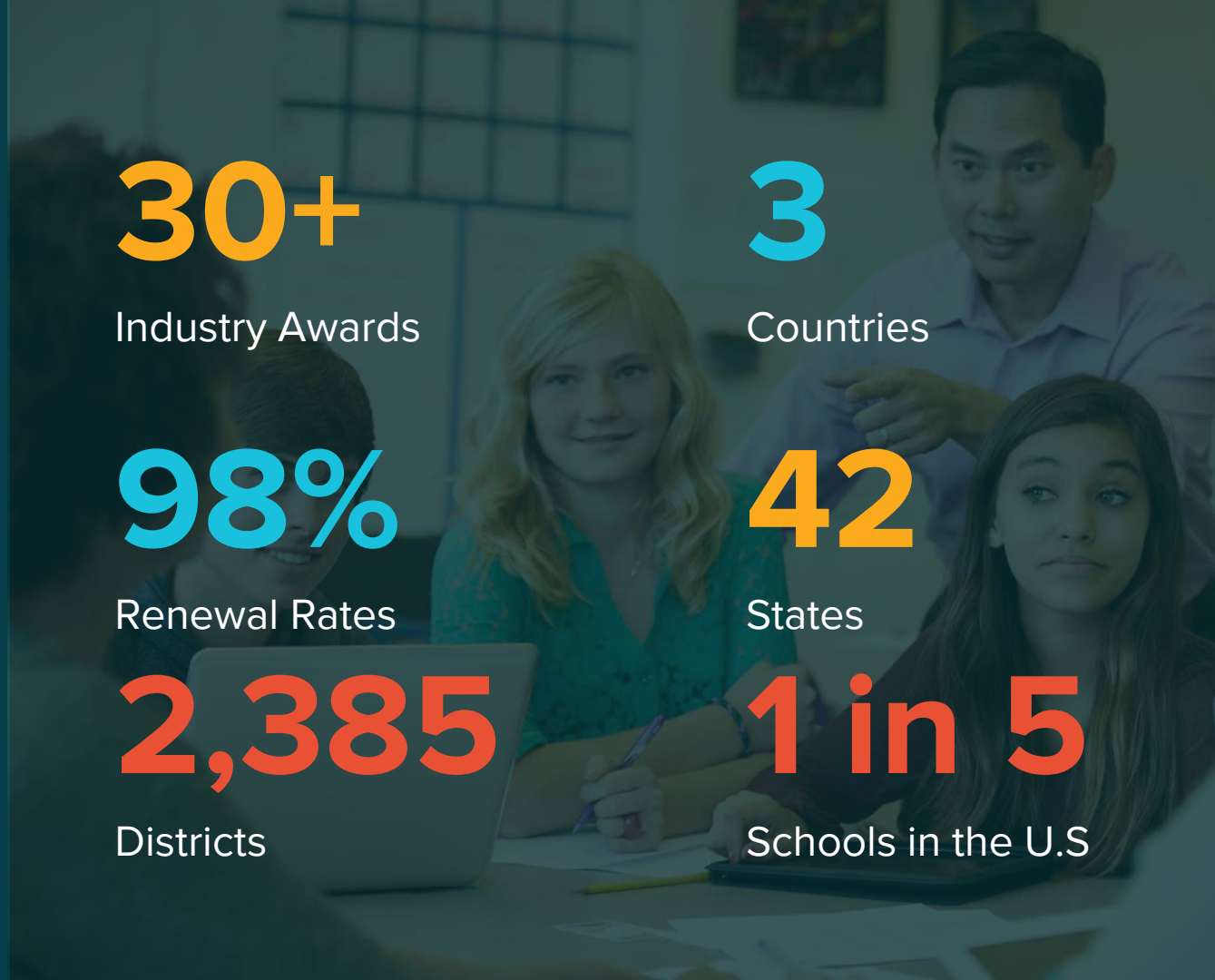
Identification with Two Indicators



Identification with Three Indicators


OUR MISSION IS TO
Improve the Way the World Learns.

The BrightBytes Footprint



30+
Industry Awards

3
Countries

98%
Renewal Rates

42
States

2,385
Districts

1 in 5
Schools in the U.S

PROBLEM

The Education Data Challenge

Data Rich Information Poor

DATA MANAGEMENT

- **Integration**
  Fragmented and antiquated systems
- **Interoperability/Quality**
  Multiple data standards and significant data quality gaps
- **Provisioning/Management**
  No secure and centralized way to share and manage sensitive data

DATA ANALYTICS

- **What Matters**
  Research on what matters is difficult to access and integrate
- **Data for Change**
  Packaging data for usability and impact is challenging and requires special expertise
- **Actionability**
  Lack of evidence and research-based recommendations and insights

Effectively Change Student Trajectories

How are you...

Accurately identifying all students at risk along the K-20 continuum?

Ensuring students are connected to the right services and support at the right time?

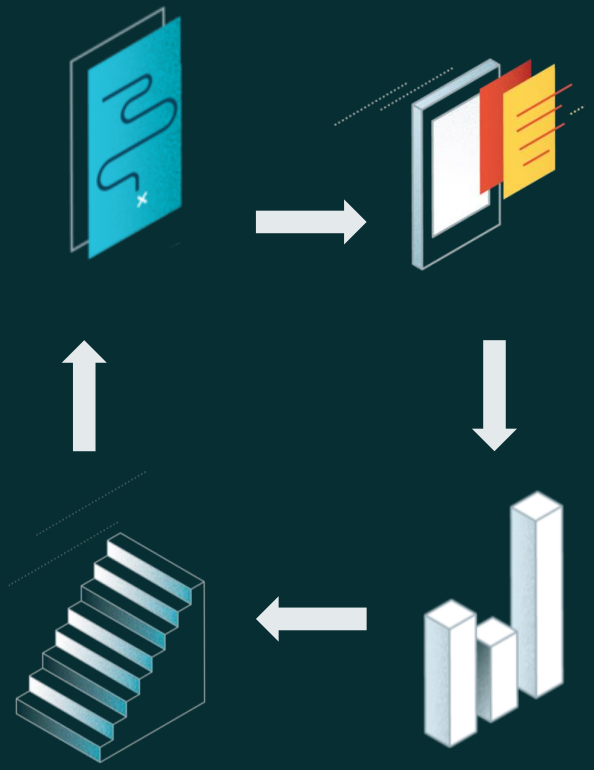
Monitoring efficacy of programs and student progress?

Platform Approach...

1 *District Data Integrator*

Data Integration

Solve for integration, interoperability, data quality and provisioning



2 *Clarity*

Research-Based Analytics

Provide high quality analysis that is informed by research and experts

3 *Clarity*

Engaging Experience

Transform analysis into engaging information

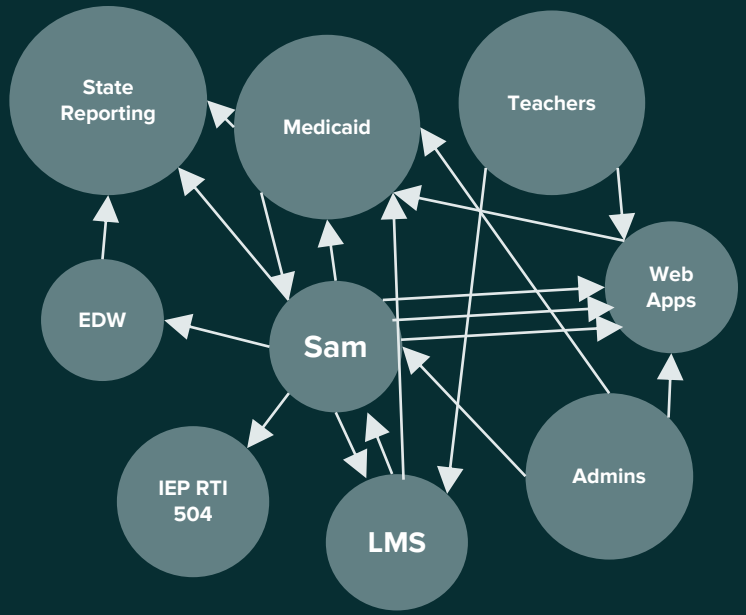
4 *Clarity*

Actionable Data

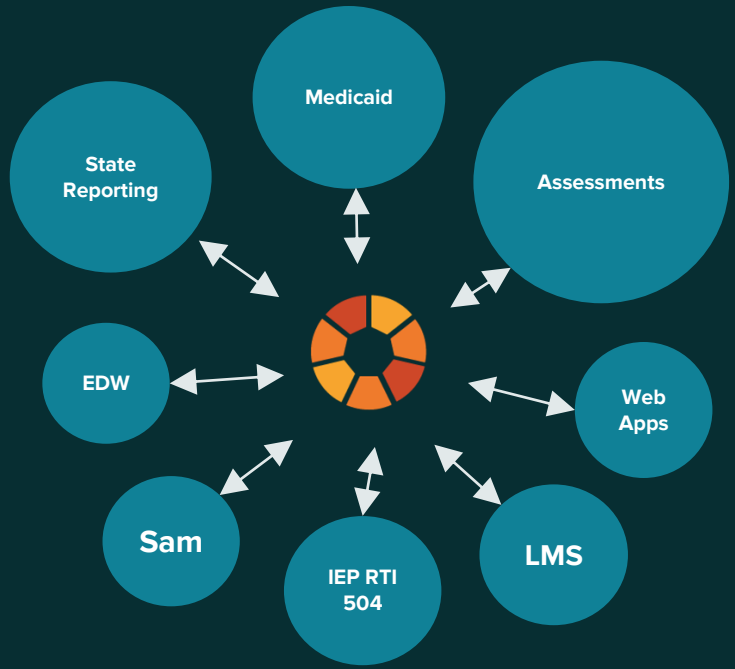
Provide tools and content that help integrate data into the day to day practice

The District Data Integrator (DDI)

Before DDI



After DDI



Analysis of Integrations

Iterative Replacement of Integrations

Monitoring and Maintenance

The Early Insights Suite

Identify, Connect & Monitor

BRIGHTBYTES RESEARCH PARTNER

The American Institutes For Research (AIR)

Founded in 1946
1800+ Employees

MISSION:
To conduct and apply the best behavioral and social science research and evaluation towards improving people's lives, with a special emphasis on the disadvantaged.

Identification: Past & Present

FIRST GENERATION Threshold Model		NEXT GENERATION Predictive Analytics
Research-based	→	Research-based
Systematic, consistent criteria	→	Customized, flexible criteria
Dichotomous yes/no	→	Draws upon multiple dynamic data points
Later identification - higher grades	→	Early identification- middle & elementary grades
Few risk indicators	→	Many risk indicators based on historical data & grade level
Static one-size-fits-all	→	Real-time district data
Limited accuracy- false positives	→	Greater accuracy minimizes false positives/negatives
Single Indicator	→	Over 30 Indicators

Common Early Warning Indicators for On-time High School Graduation

Course Performance

Attendance

Behavior

THE PROBLEM

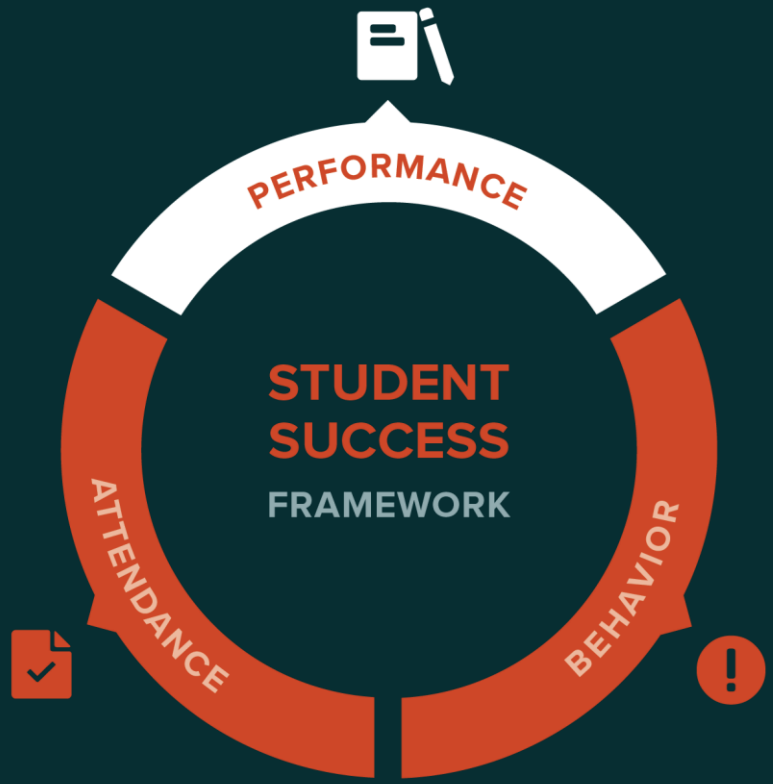
The Preparation Gap for On-Time Graduation and College Readiness

- Large numbers of freshmen enter college unprepared each year, destined for remediation classes that teach material they should have learned as high schoolers.
- The on-time graduation rate for college students who begin in remediation is around 10 percent.
- Students graduating with a state's standard high school diploma need remedial coursework at higher rates than those with the advanced diploma.

STUDENT SUCCESS FRAMEWORK

PERFORMANCE

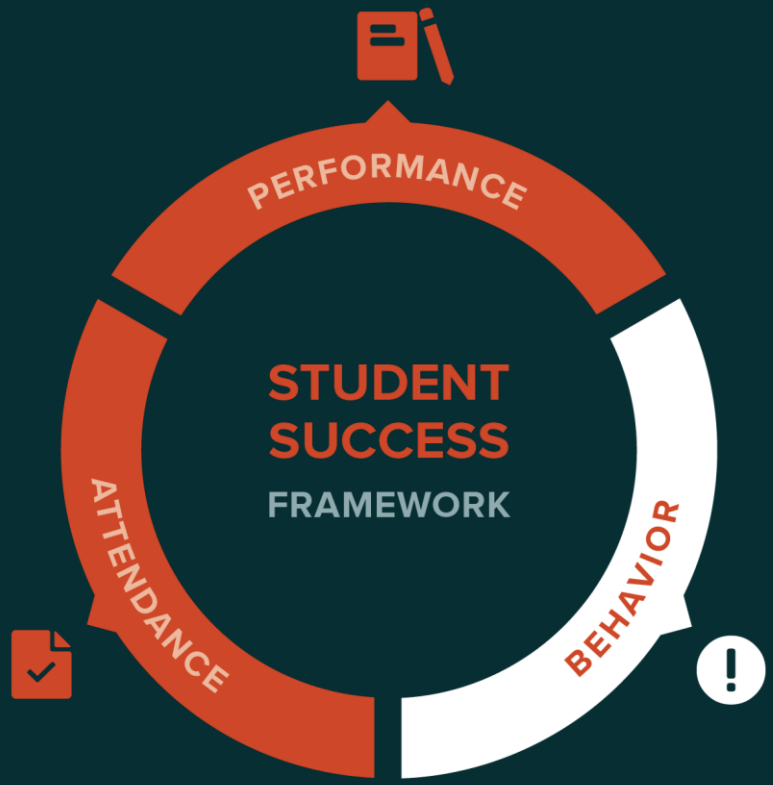
- Coursework
- Advanced Coursework
- Gateway Coursework
- Assessments
- College Entrance Exam Participation



STUDENT SUCCESS FRAMEWORK

BEHAVIOR

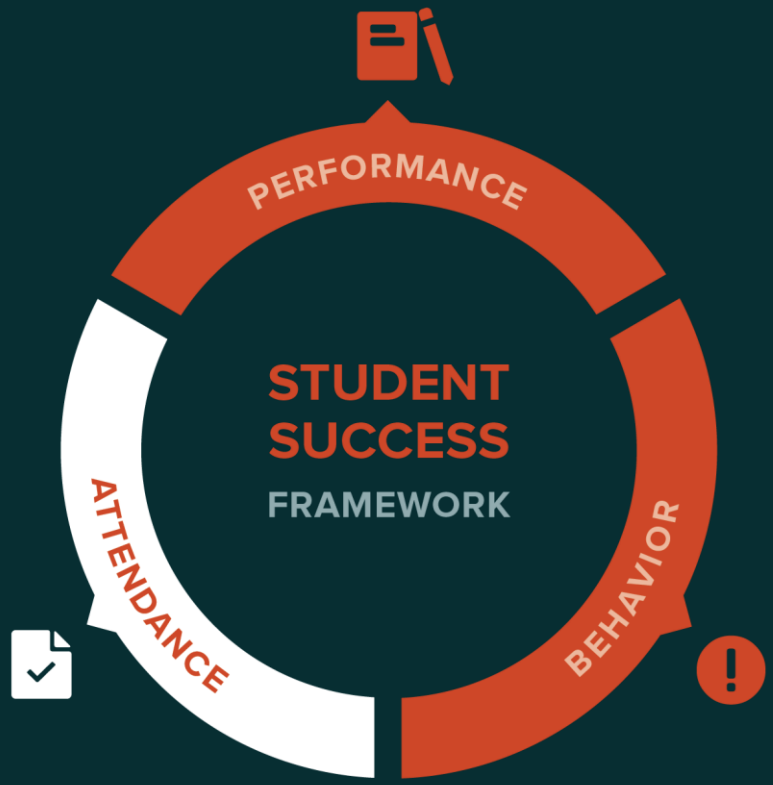
- Behaviors: Minor
- Behaviors: Major
- Consequences: Referrals
- Consequences: Detentions
- Consequences: Suspensions
- Consequences: Expulsions



STUDENT SUCCESS FRAMEWORK

ATTENDANCE

- First 30 Days
- Attendance To Date
- Tardies
- Chronic Absenteeism



Single Cut Point Indicator Vs. Predictive Analytics

Brooke
5th Grader
Overall Risk Is High

NOTE: Brooke would not have been identified using traditional models:

1. Brooke is in 5th grade
2. Brooke wouldn't have been detected on a single indicator cutpoint model

RISK INDICATORS (TIMEFRAME IS PRIOR 12 MONTHS)	STUDENT DATA	SINGLE CUT POINT INDICATOR MODEL	BRIGHTBYTES PREDICTIVE MODEL	
			RISK LEVEL	OVERALL DOMAIN RISK
Attendance Rate	97.0%	Not Detected	Moderate	High
Total Absent in First 30 Days	6		High	
Tardy Rate	5.8%		High	
Chronic Absent	No		Low	
# of Major Behavioral Incidents	0	Not Detected	Low	High
# of Minor Behavioral Incidents	3		High	
Average Course (GPA)	2.11	Not Detected	High	High
Courses Passed	98.0%		Low	
Summative Assessment: Math*	Slightly Below		Low	
Summative Assessment: Reading*	Far Below		High	
Summative Assessment: Science*	Below		High	
Summative Assessment: Social Studies*	Below		High	

A NEW WAY TO ORGANIZE & UNDERSTAND DATA...

Communicated through spreadsheets

↓

Visually communicated

A NEW WAY TO ORGANIZE & UNDERSTAND DATA...

Data floats without context or research

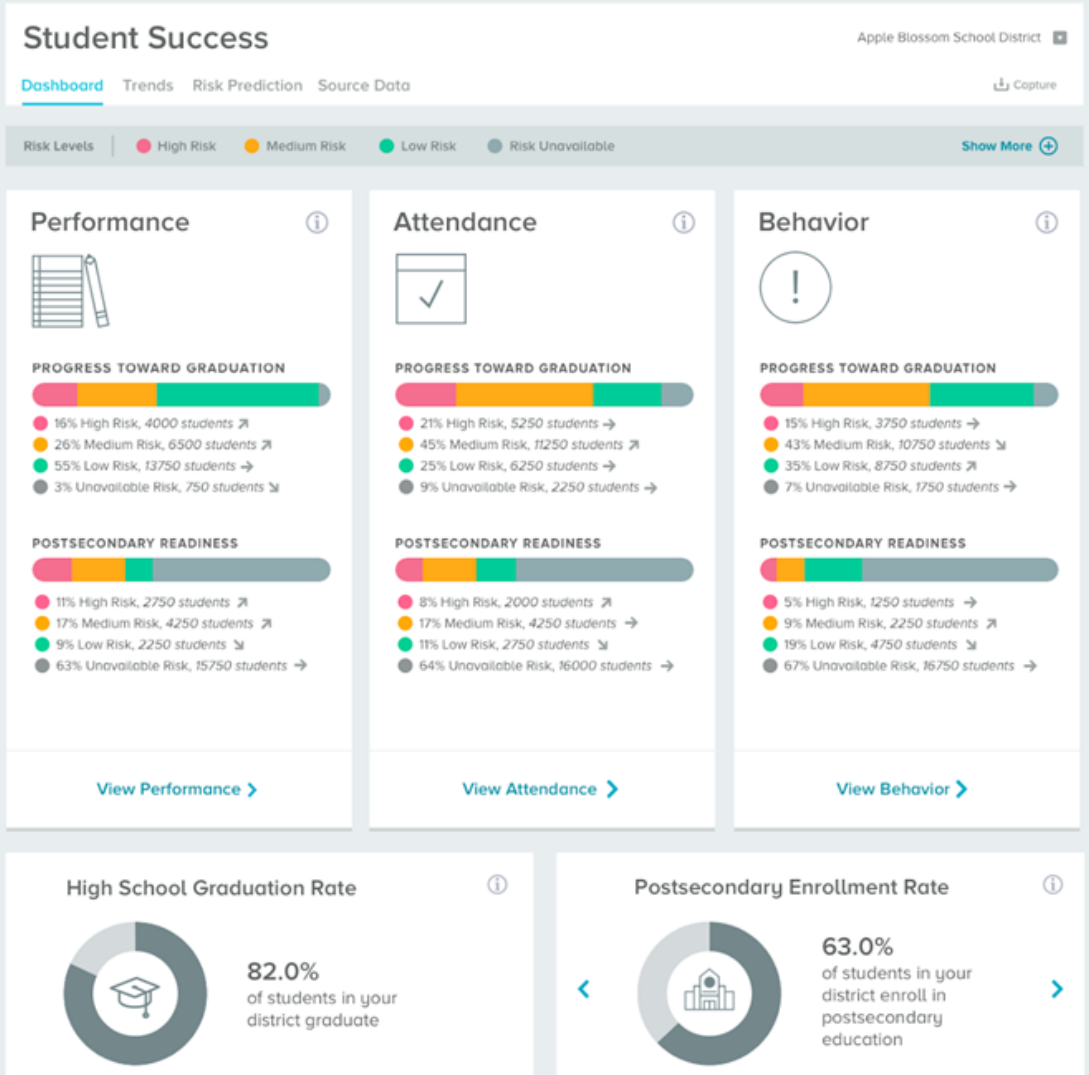
↓

Analysis is research based

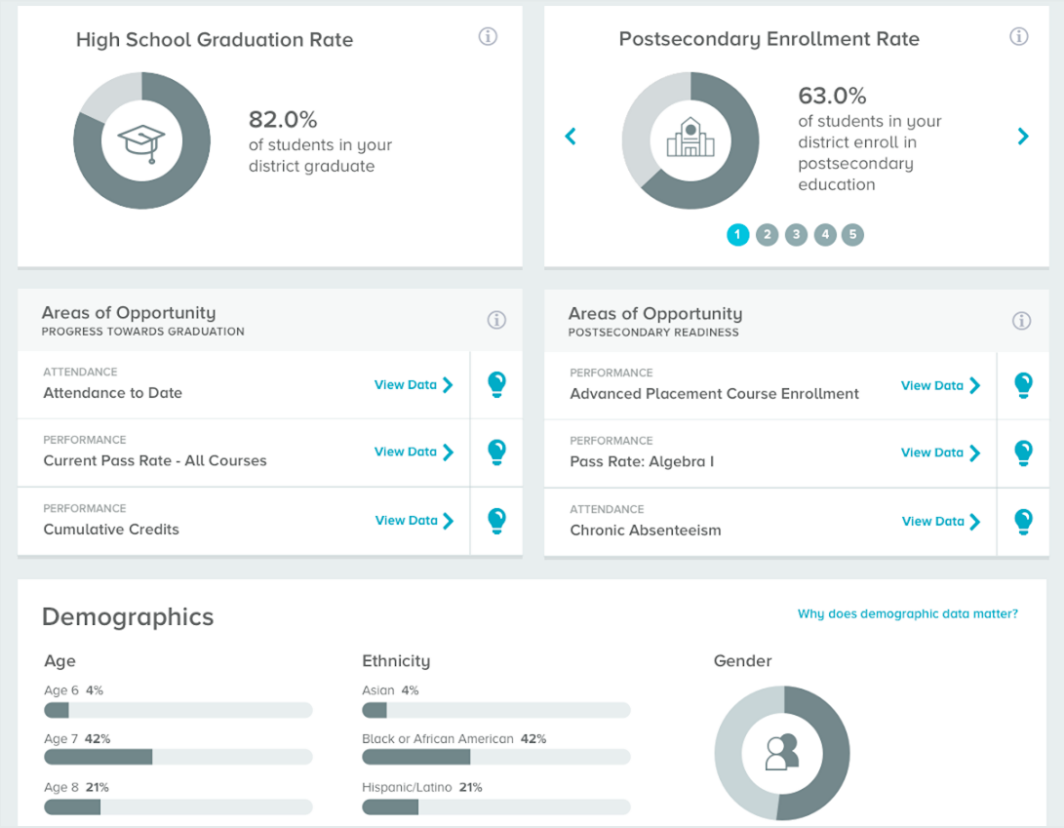
STUDENT SUCCESS

Comprehensive Dashboards to Highlight Target Areas

1. Easily see which schools need the most support
2. Quickly identify target areas of greatest need



GRADUATION RATE & POSTSECONDARY READINESS



STUDENT SUCCESS

Attendance to Date

Quick Wins

Game Changers

Innovators

Quick Win

1 of 7

Create Attendance Response Teams

Save PDF Share via email

Address chronic attendance issues using dedicated response teams. For each grade level, create a small team that includes teachers, administrators, and other school personnel. Have the teams use the Early Warning data to identify students in their assigned grade who are at risk for attendance.

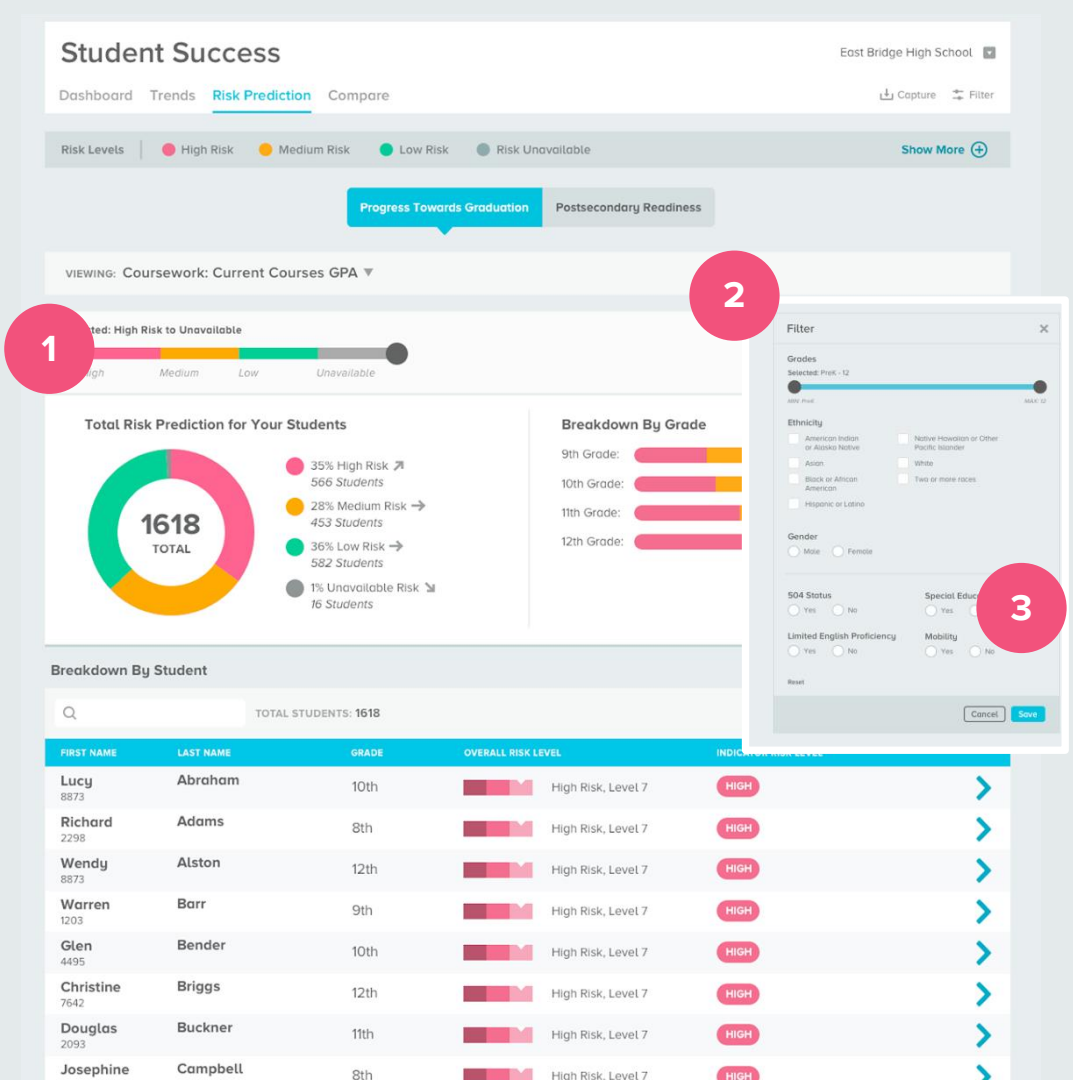
Next, ask them to divide up the high and moderate risk students. Each member will work directly with their assigned students and their families to identify and record potential causes for students' chronic absenteeism.

(Adapted from "Stepping Up the Pace")

Arm Attendance Response Teams with Tools and Strategies

INSIGHTS

1. Quick Wins
2. Game Changers
3. Innovators



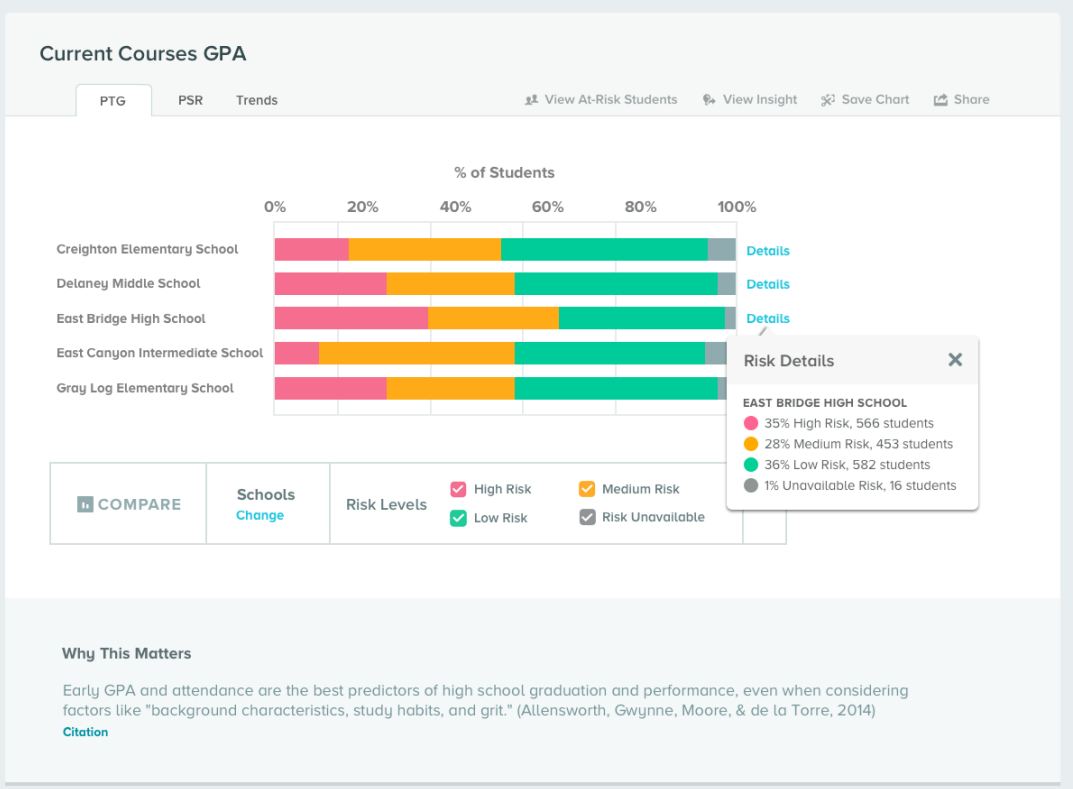
RISK PREDICTION

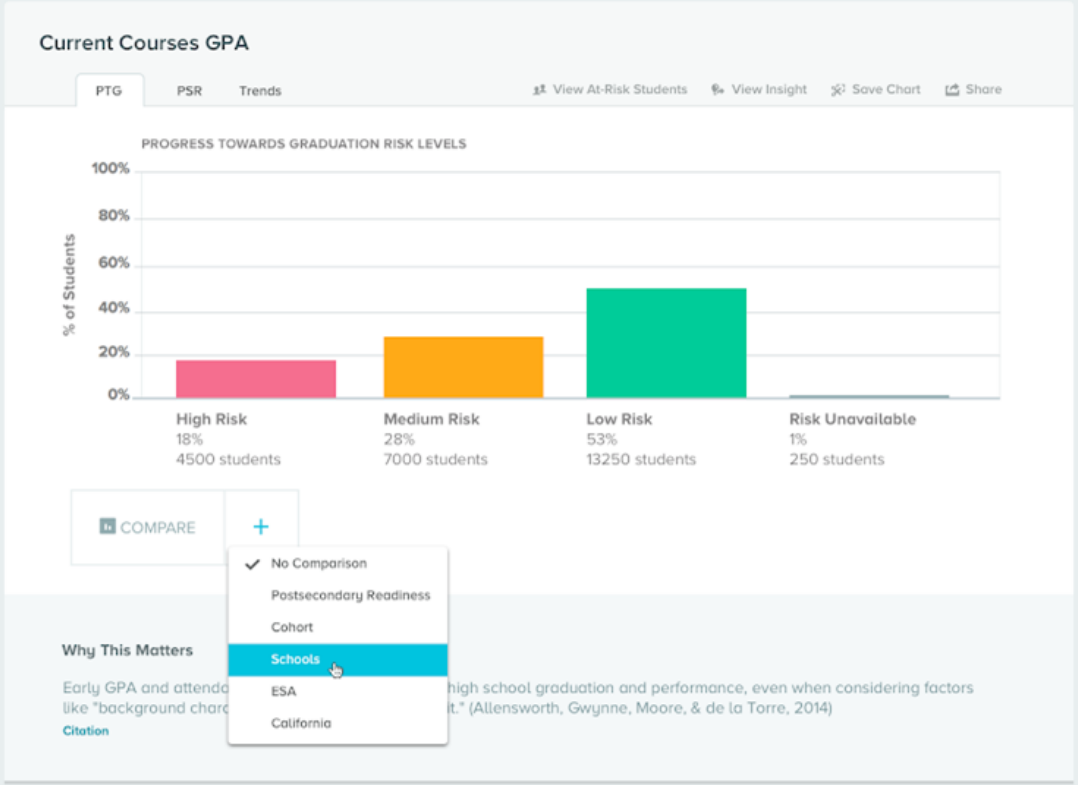
Access Aggregate Reports with Advanced Filters

1. See your organization's risk allocation at a glance
2. Filter by specific demographics
3. Identify individual students as early as first grade
4. Notify Administration and Guardians

DRILL DOWN ON SUCCESS INDICATORS IN DOMAINS

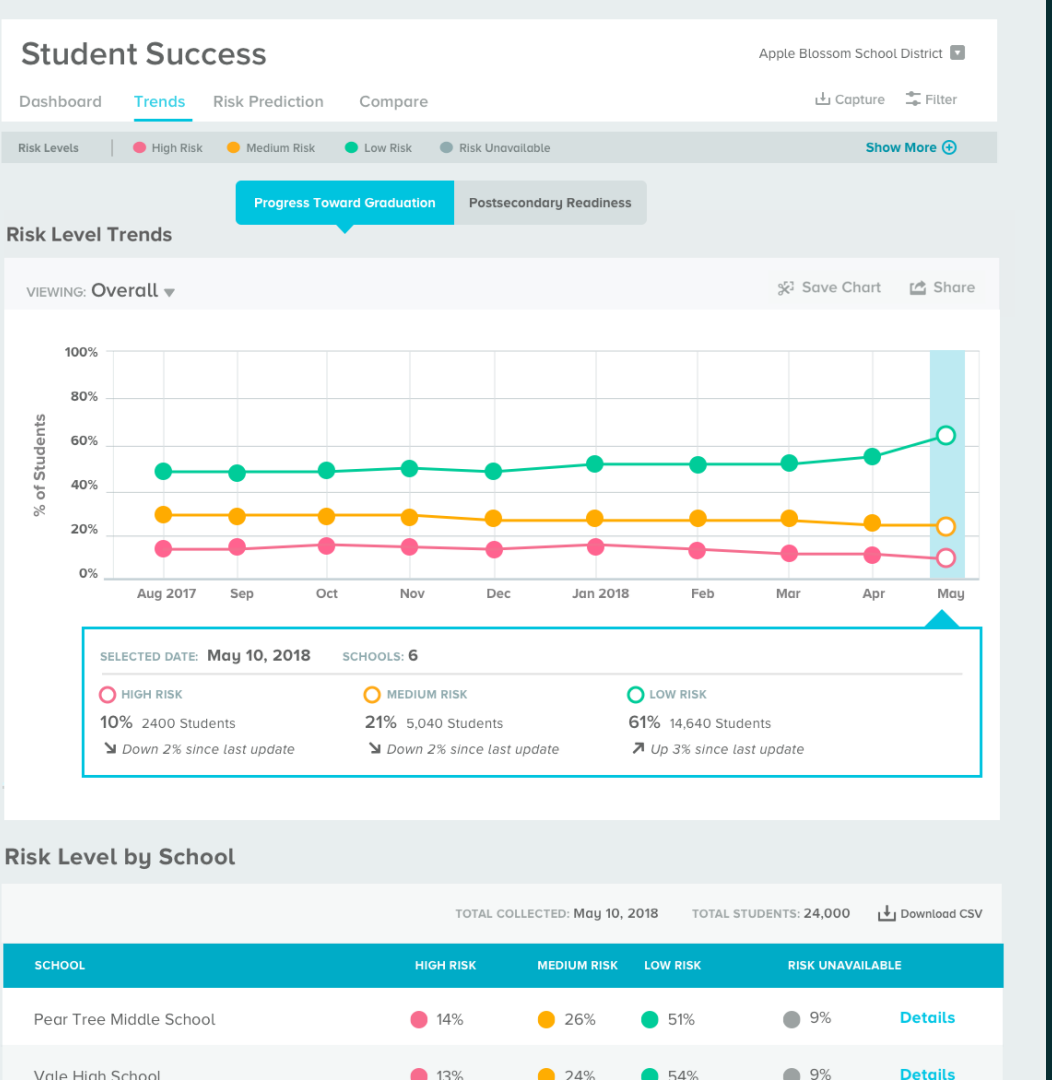
1. Percentage of Risk
2. View Students
3. Risk Details
4. Compare
5. Research





SIDE-BY-SIDE RISK LEVELS COMPARISONS

1. Cohorts
2. Students
3. Service Agencies
4. State



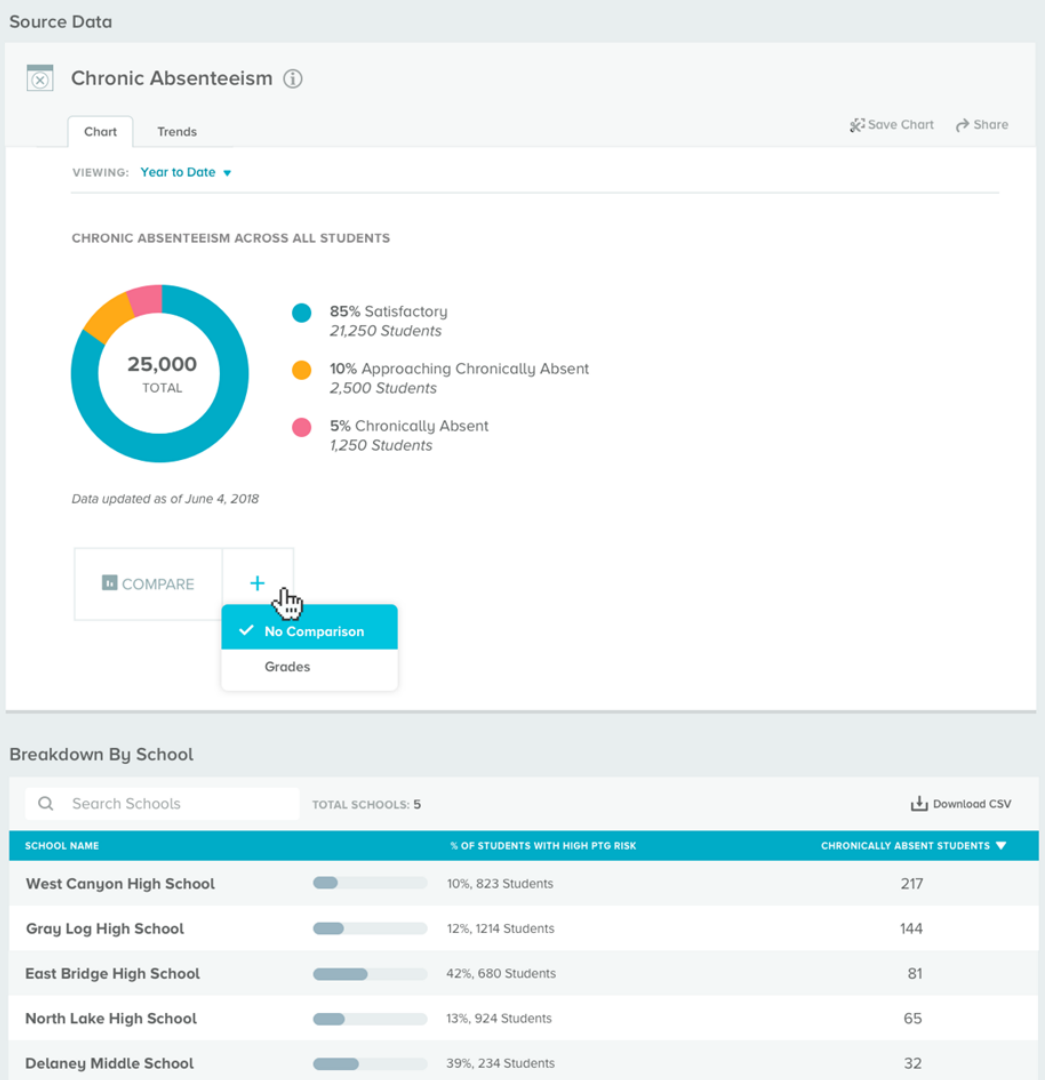
SCHOOL LEVEL -

TRENDS OVER TIME

Track site-level progress with access to trend data across the organization

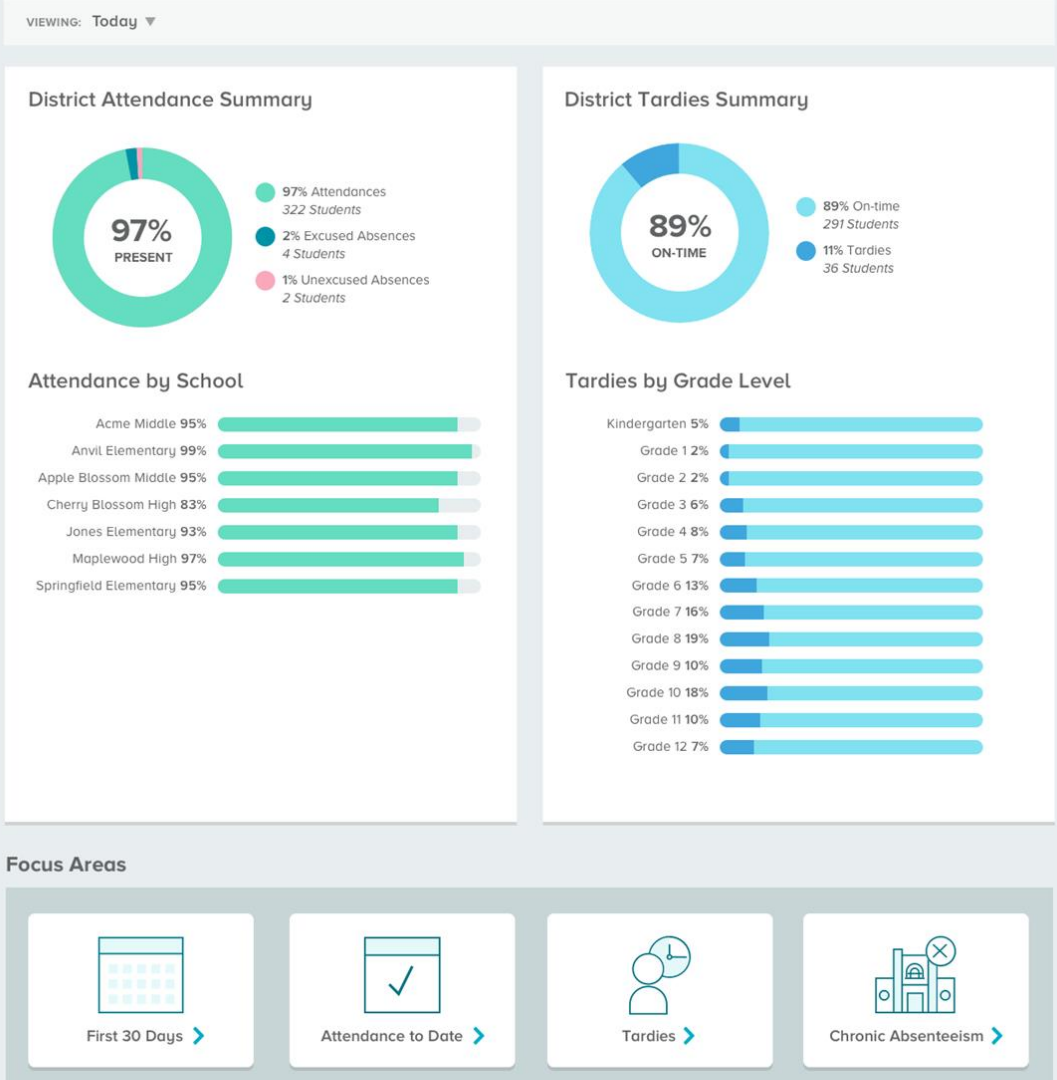
CONTEXT CARD

Explore source data in context with relevant research

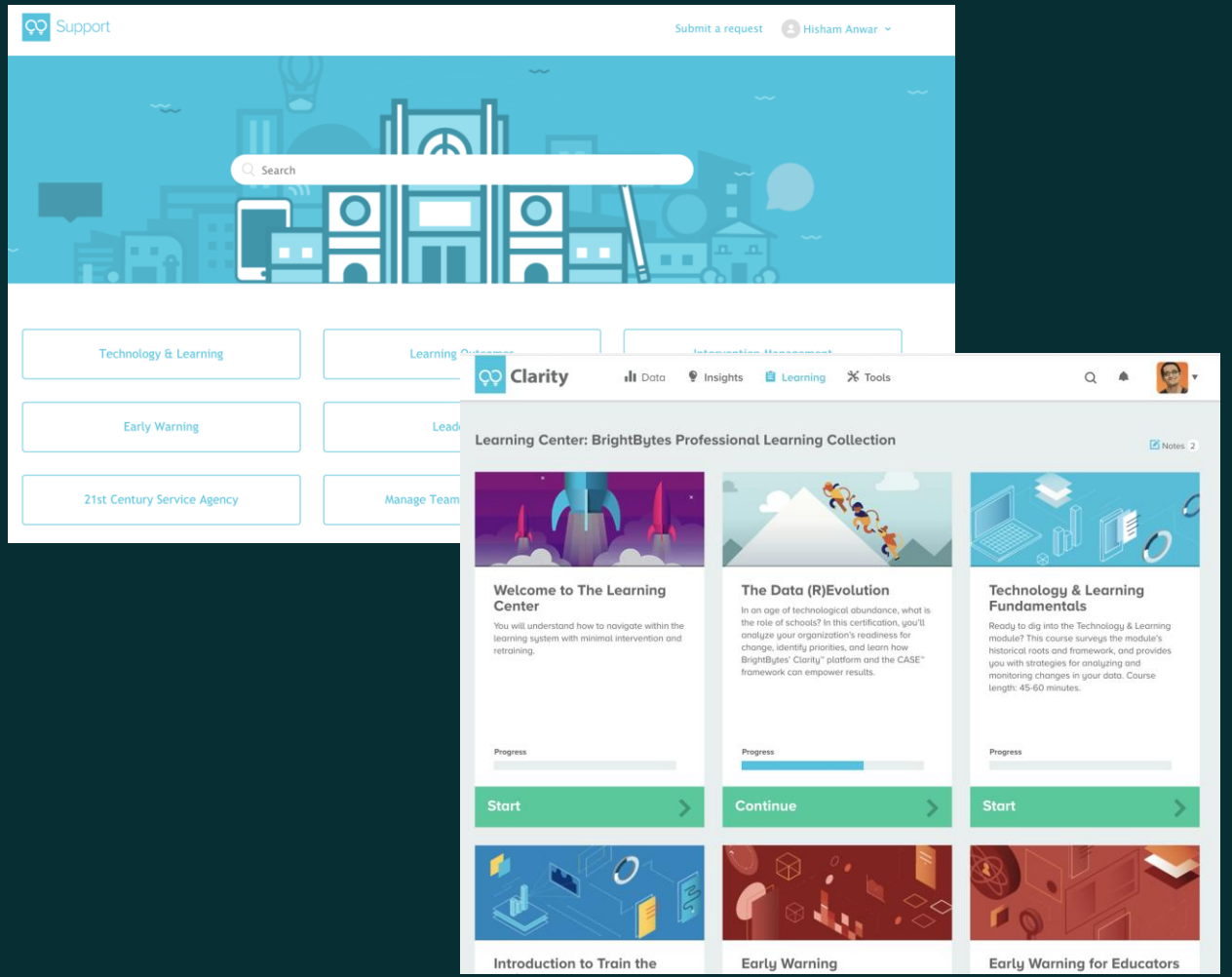


DEEP VISIBILITY INTO RELEVANT DATA

Easily understand how risk is calculated with visibility into relevant source data across the district

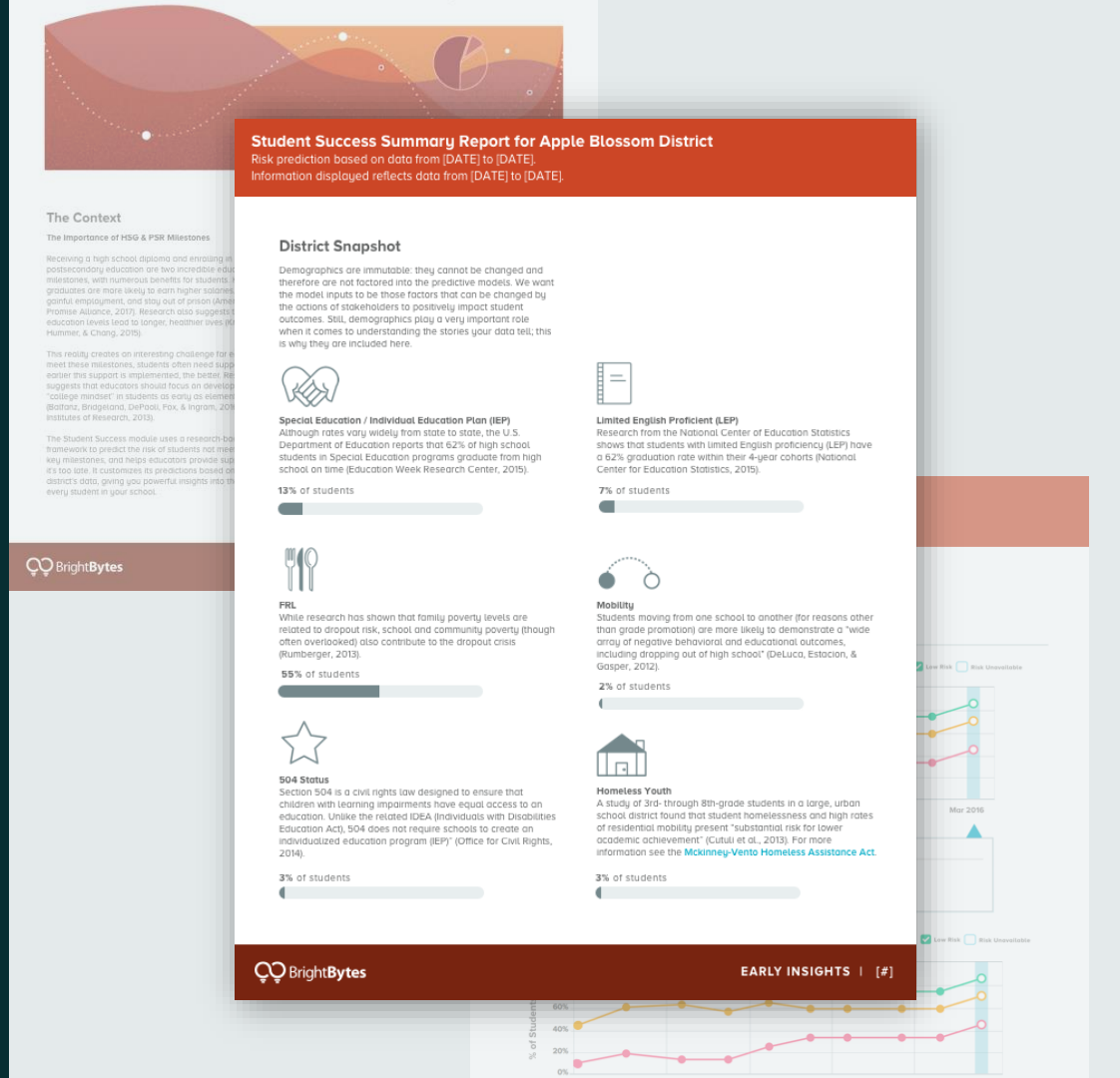


Embedded Support & Training



REPORTS

Access a personalized report unique to every organization with easy-to-read infographics for quick decision-making.



Bridging the Gap

How are you...

Accurately identifying all students at risk along the K-20 continuum?

Ensuring students are connected to the right services and support at the right time?

Monitoring efficacy of programs and student progress?

INTERVENTION FRAMEWORK

CONTEXT

- Summary - Concerns & Referrals
- Concerns - Escalated

INTERVENTION FRAMEWORK

SUPPORT

- Resources Utilized
- Connected Referrals

INTERVENTION FRAMEWORK

PROGRESS

- Services - Completed
- Process Summary

INTERVENTION FRAMEWORK

IMPACT

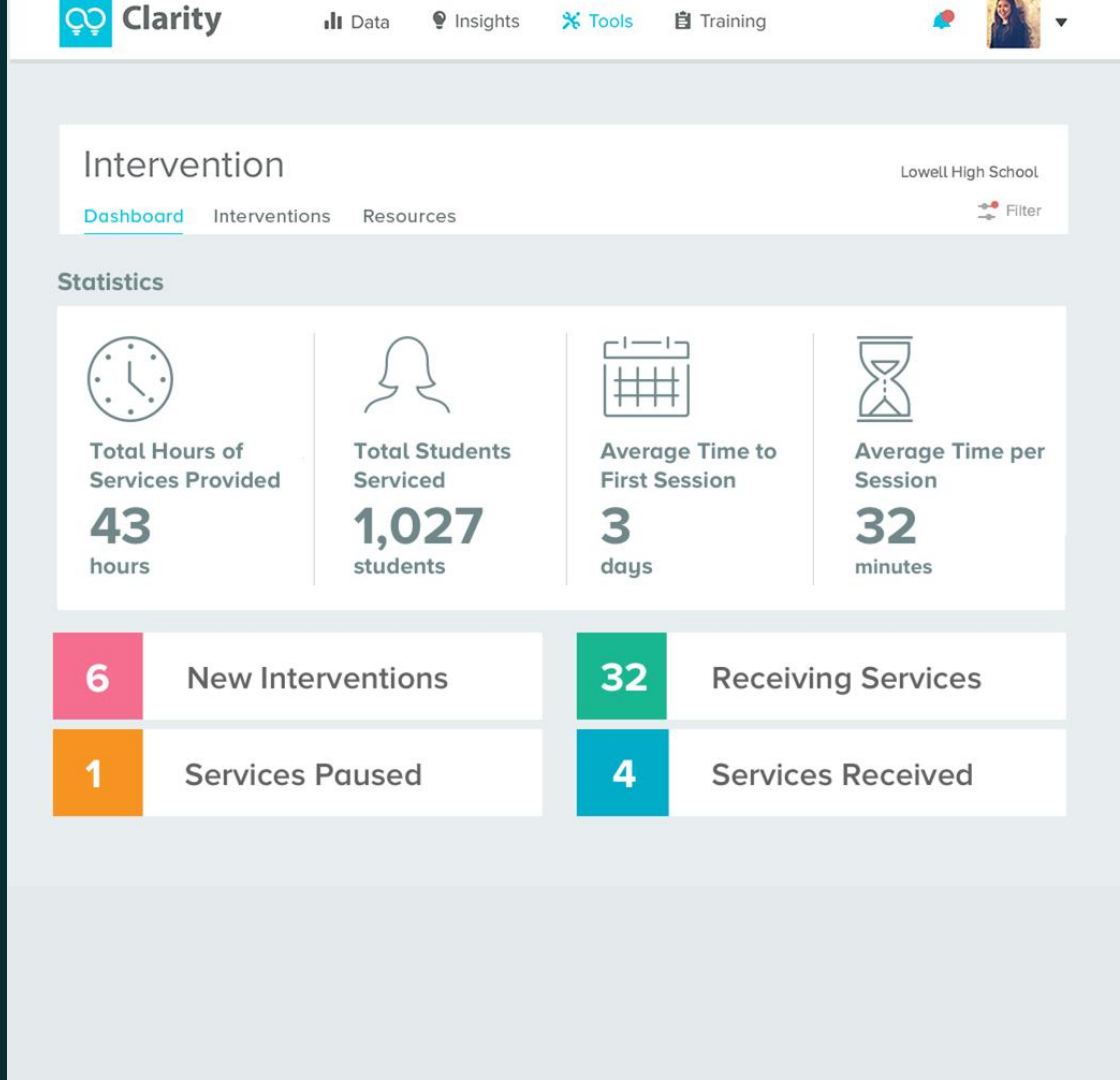
- Students Actively Receiving Services
- Students who Recently Completed Services
- Standardized Measurements

INTERVENTION

AT-A-GLANCE DASHBOARDS

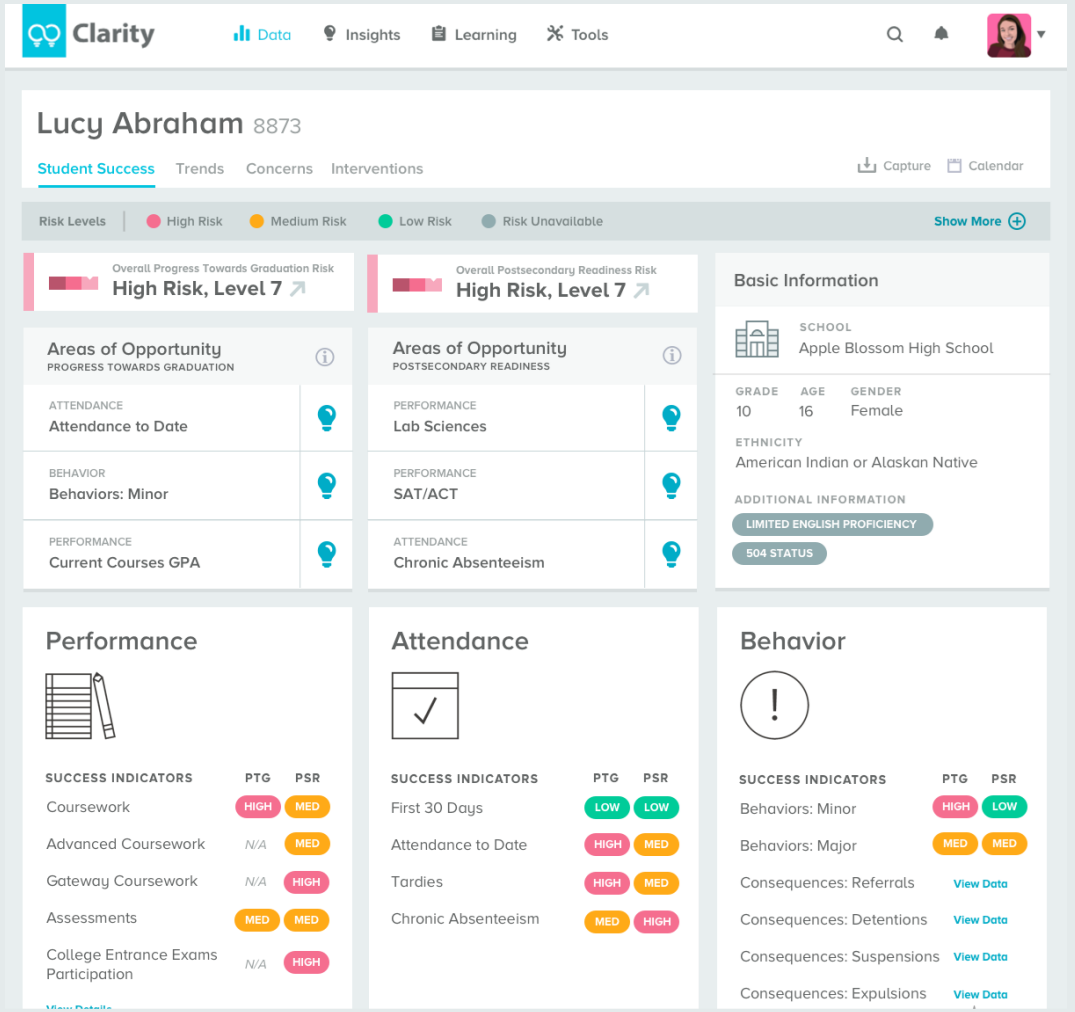
Create the Right Support for Students

Ensure proper resource allocation



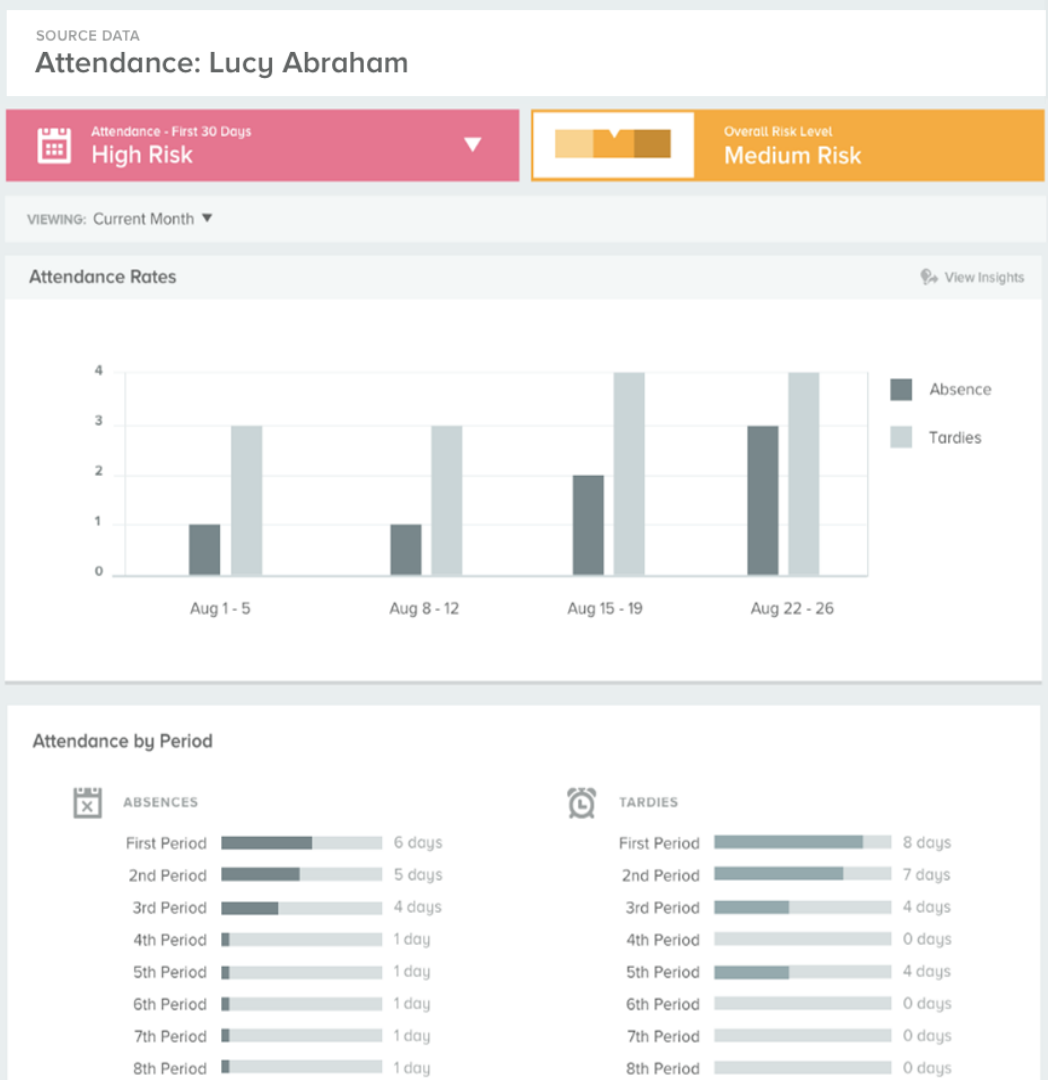
STUDENT PROFILE

1. Areas of Opportunity
2. Basic Information
3. Domain and Indicator Risk Levels
4. Trends
5. Concerns
6. Intervention



STUDENT PROFILE DATA

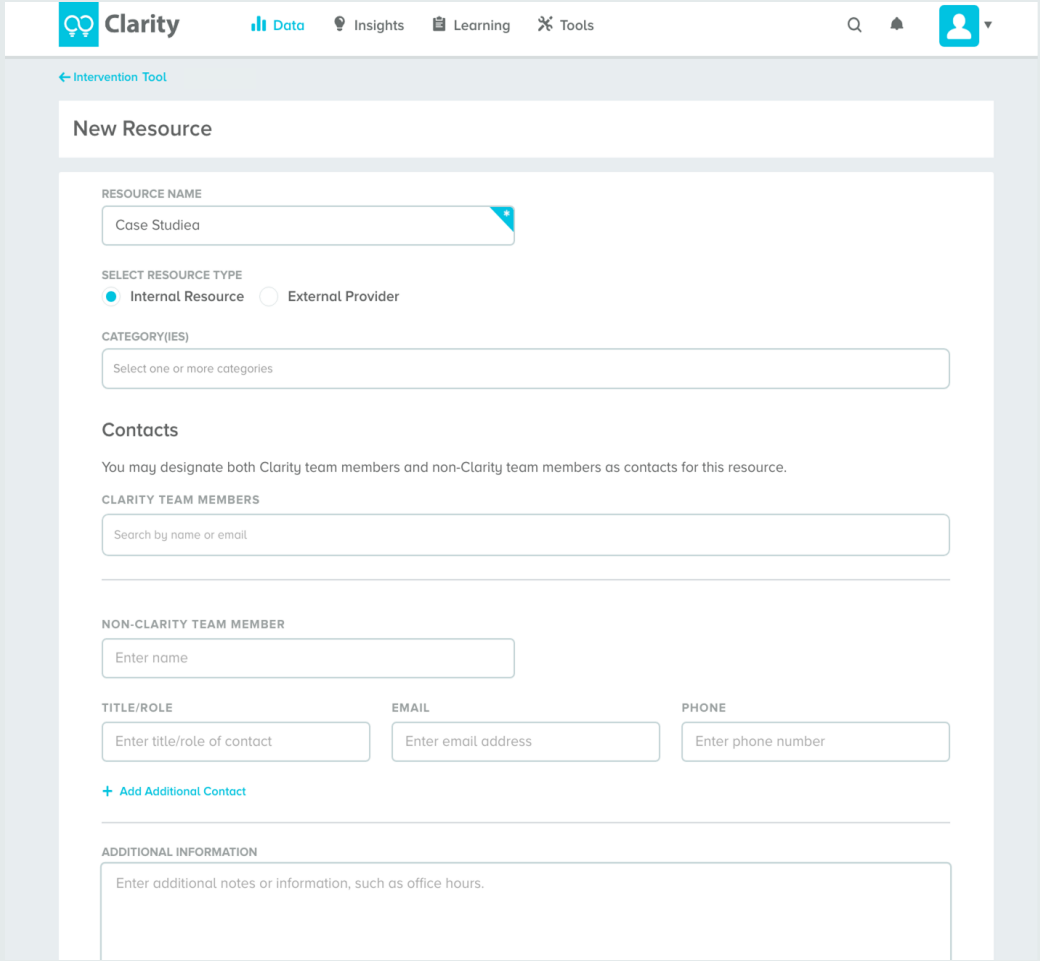
Explore source data that informs risk level



ADDING RESOURCES

Provide Resource Mapping

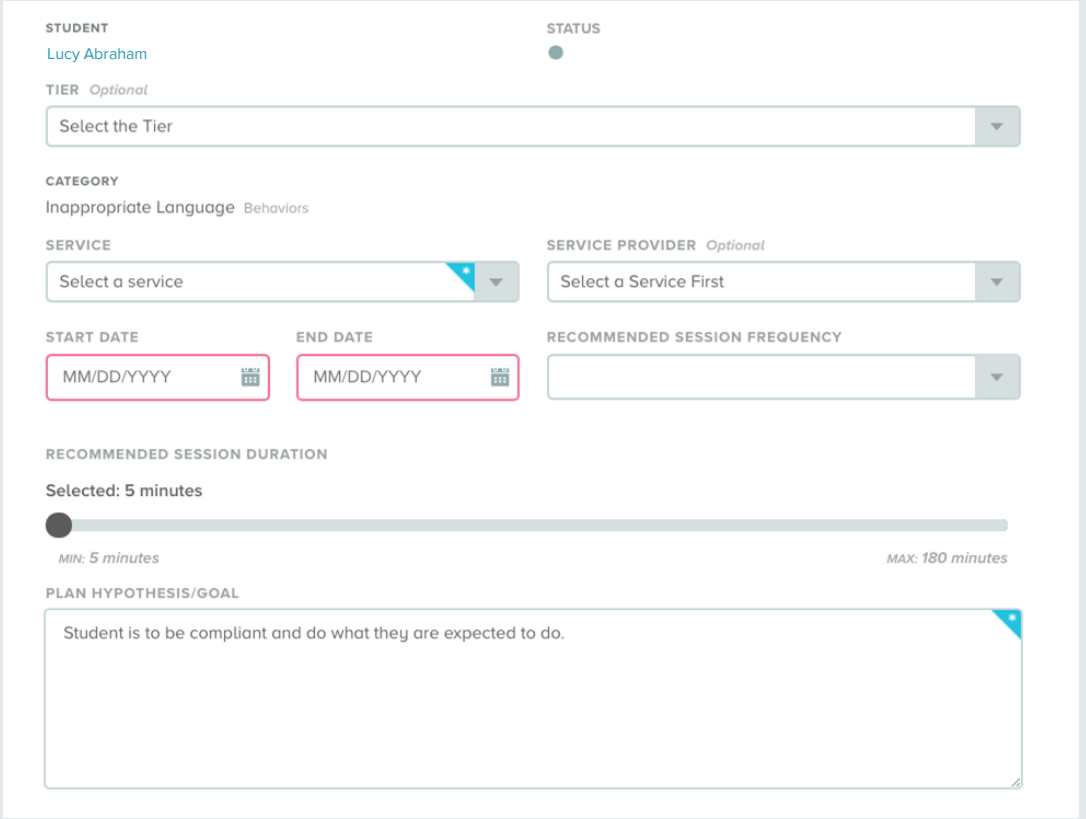
Select appropriate resources and determine contacts for each intervention effort



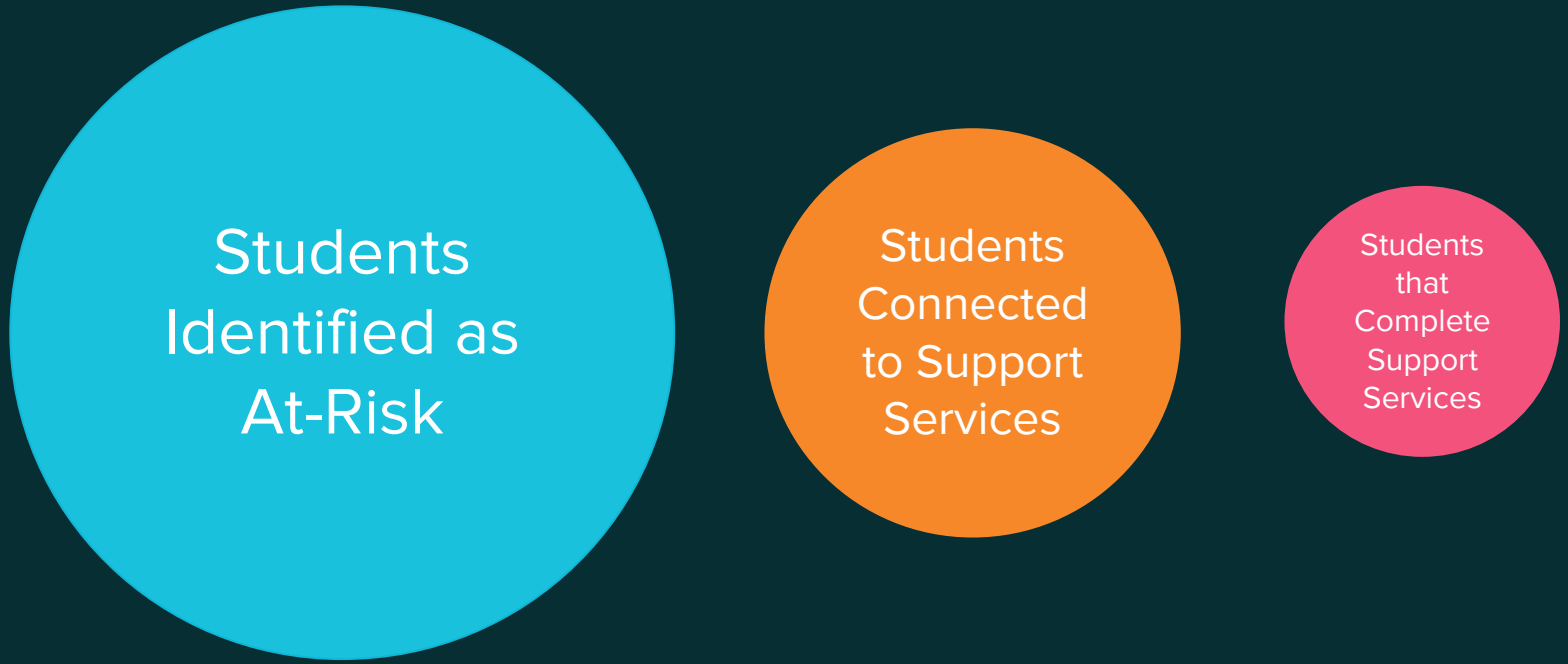
NEW INTERVENTIONS

Assign Interventions to Students Easily

Refer students for the most beneficial services



The Process of Slipping Away



Monitor to Ensure Outcomes

How are you...

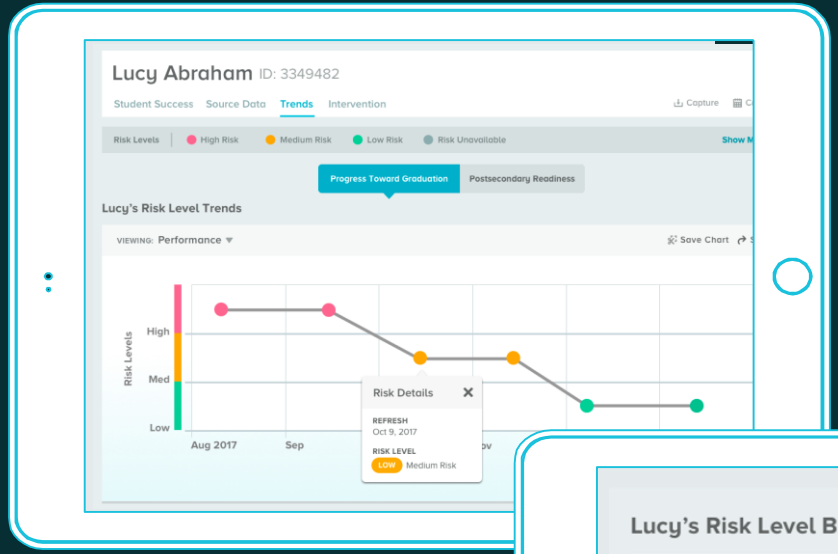
Accurately identifying all students at risk along the K-20 continuum?

Ensuring students are connected to the right services and support at the right time?

Monitoring efficacy of programs and student progress?

TRENDS & AT-A-GLANCE VIEWS

Understand Intervention Effectiveness

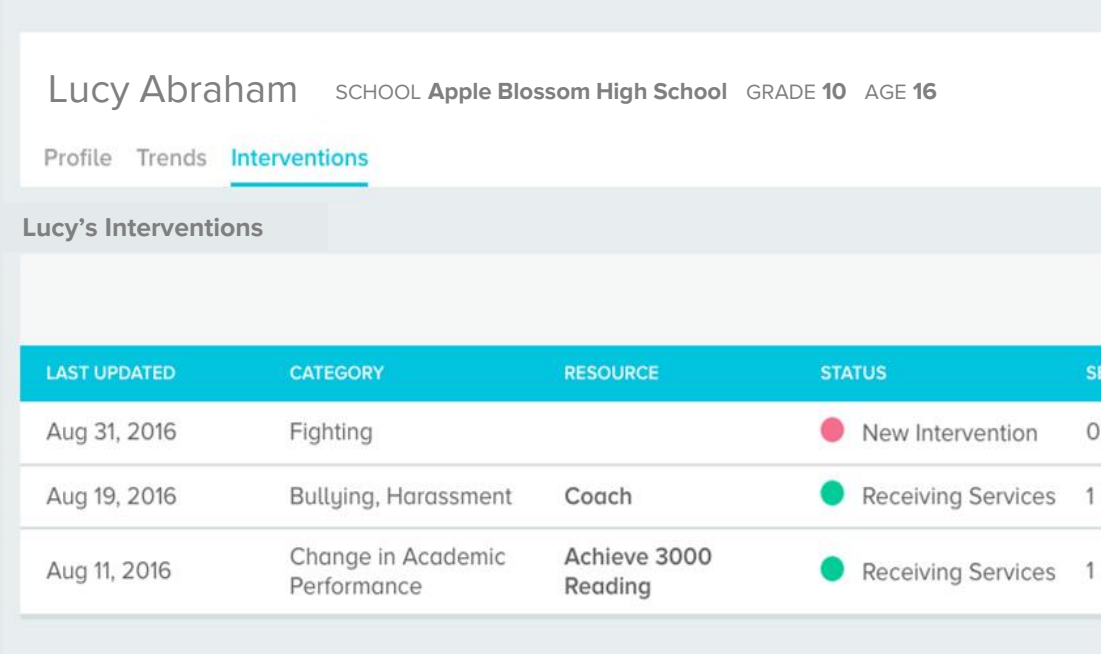


Set goals and measure progress at the student level

Drill down to change over time at the micro level

STUDENT PROFILE

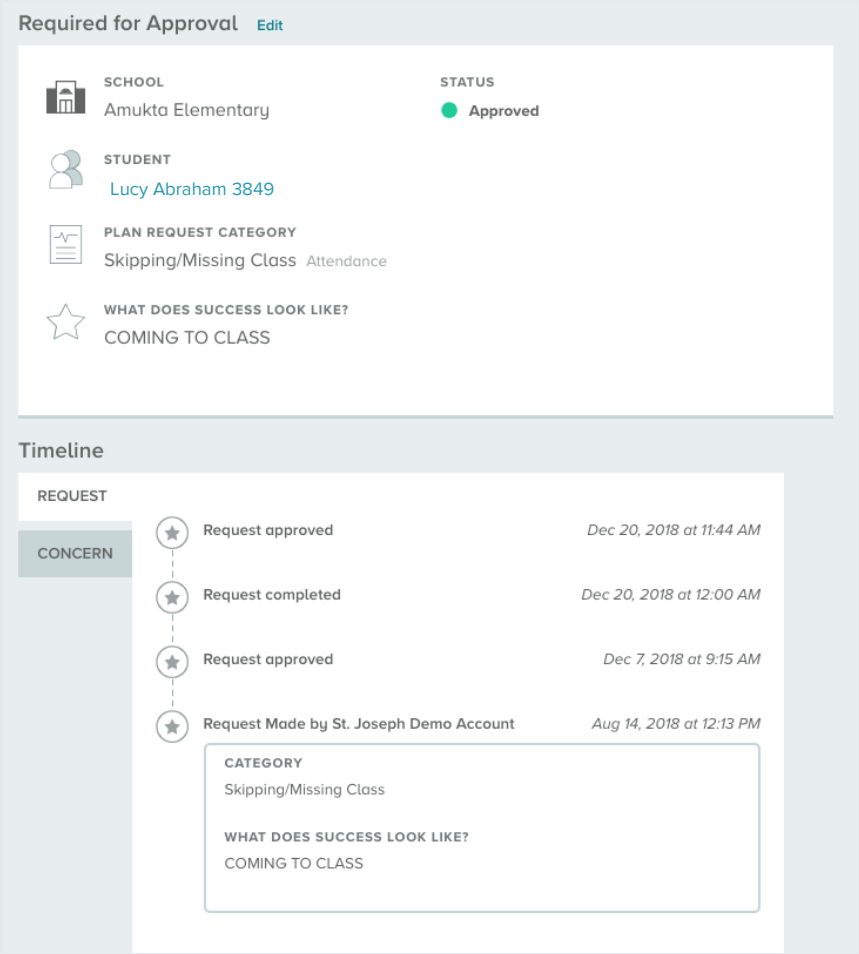
Explore Intervention History



NOTES & HISTORY

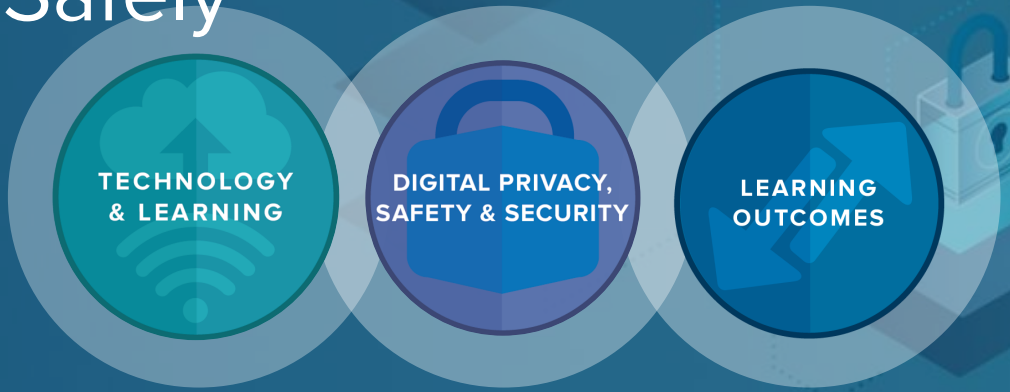
Review Intervention Plans & Concerns

View the history of past intervention requests and efforts

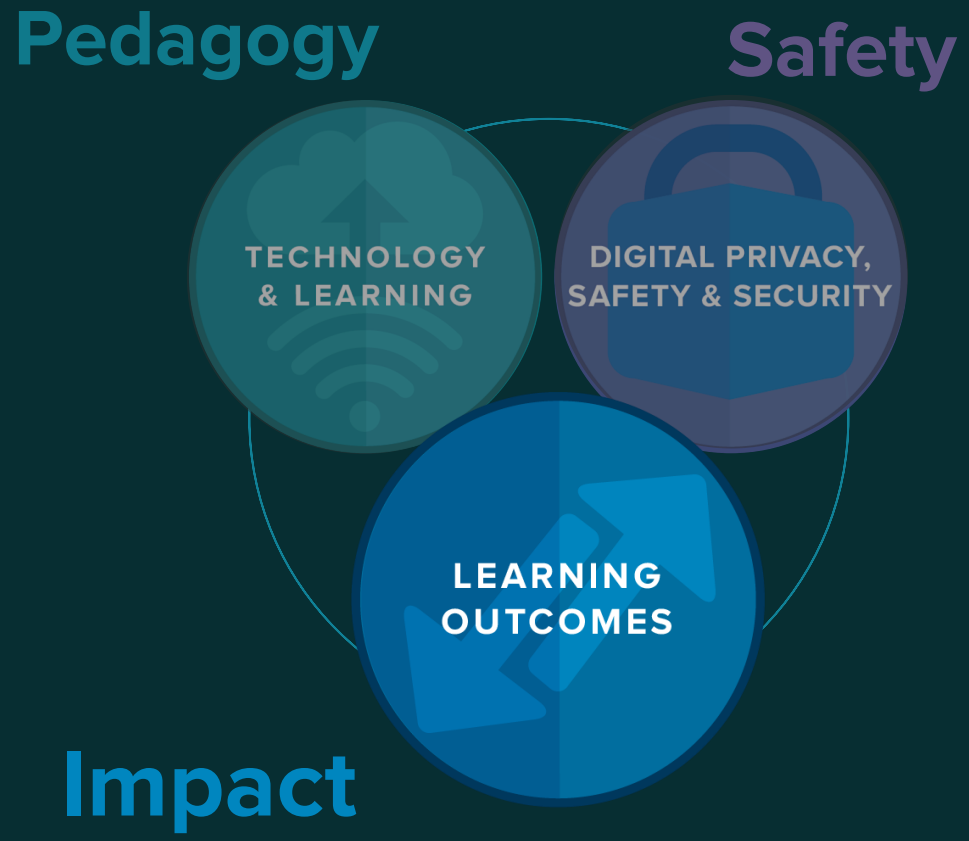


The 21st Century Learning Suite

Plan and Measure Technology Investments to Drive Student Learning Safely



Measure and Monitor the Efficacy of Your Ed Tech



Challenges of 21st Century Learning

$13B

Total Ed Tech Investment

37%

Of Purchased Apps Are Never Activated

353

Public School Cybersecurity Attacks in 2018

(EdWeek; Data Quality Campaign) The Education Technology Industry Network (ETINU.S); FERPA|Sherpa; K-12 Cybersecurity Map, Inside Higher Ed)

BRIGHTBYTES RESEARCH PARTNER

Penn
University of Pennsylvania

LEAD RESEARCHER

DR. RYAN S. BAKER

Associate Professor, Teaching, Learning, and Leadership Division Graduate School of Education, University of Pennsylvania, Director of the Penn Center for Learning Analytics

- Served as founding president of the International Educational Data Mining Society
- Currently co-lead of the Big Data in Education spoke of the NSF Northeast Big Data Hub
- Developed automated detectors that make inferences in real-time about students' affect and motivational and meta-cognitive behaviors

Q&A