

Solution Overview - Power BI Starter Kit

December 18, 2018

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Introduction

The Sample Education Data Analytics project is a project to illustrate how to use Microsoft Power BI, a business intelligence (BI) toolset, to create meaningful visualizations from analysis of data contained in an Ed-Fi ODS. The result is a set of reports at the district, school, teacher, and student level for early warning indicators described in the Balfanz model.

The proof of concept was intended to explore a few key questions on behalf of the Ed-Fi community, and to generate data that can help community members shape their plans and investments. Those questions were:

- What are the capabilities of emerging commercial off the shelf (COTS) toolsets for business intelligence?
- How can those COTS BI toolkits be applied to the Ed-Fi operational datastore and data in Ed-Fi format?
- How can organizations effectively deploy COTS BI toolkits based on Ed-Fi at scale, including considering both security and ease-of-use? For this question, the POC pursued integration with the K-12 identity platform strategy of Microsoft.

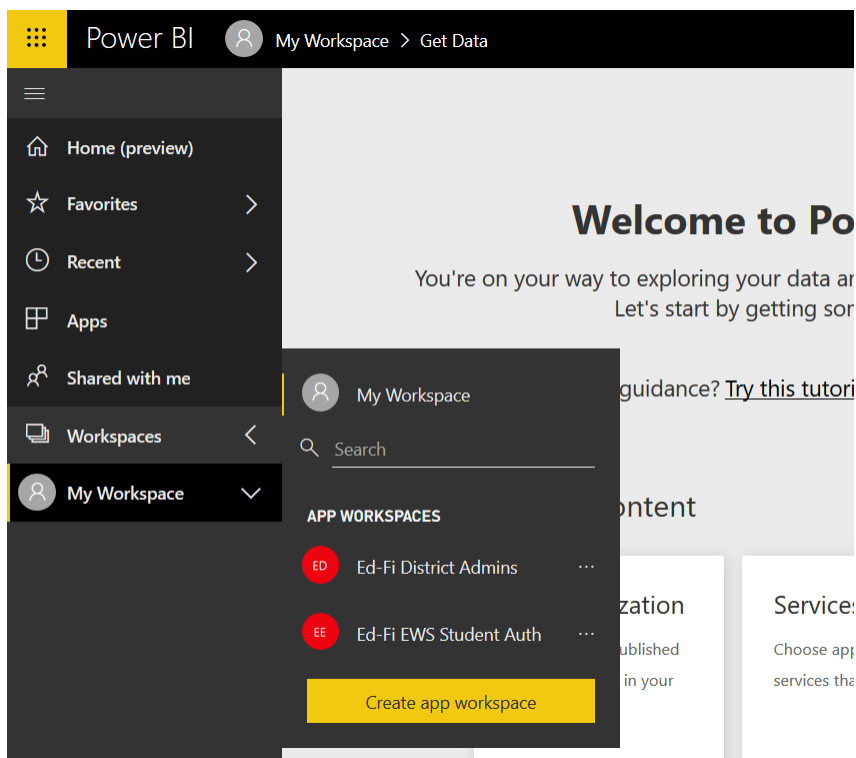
For more information on the Balfanz model, see for example Dr. Balfanz's [Johns Hopkins profile](#) and [On Track for Success: The Use of Early Warning Indicator and Intervention Systems to Build a Grad Nation](#) (hosted by Department of Education).

Sample Screens

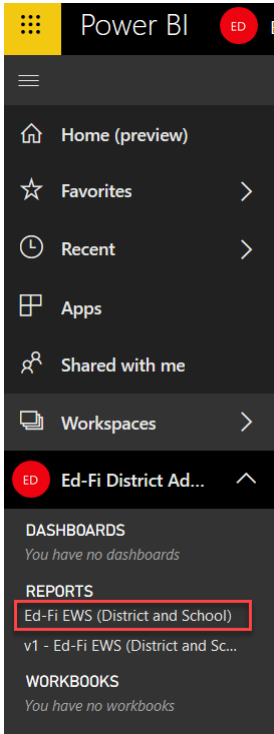
These screenshots demonstrate the deployed visualizations hosted on PowerBI.com, using the Ed-Fi Glendale data set, containing realistic yet fake student data.

Accessing the Reports

When a user first signs-in, the user will need to select a workspace. The workspace(s) available will depend on how the PowerBI reports are shared by the administrator. As there are two reports, targeting different audiences, these screenshots come from two different users.

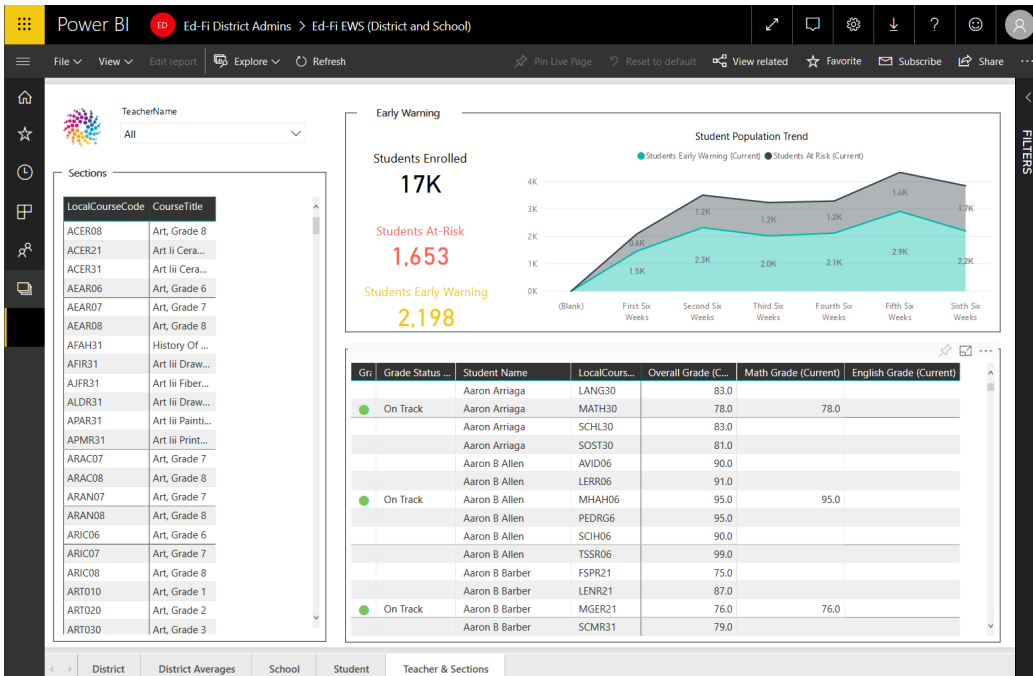


After selecting a workspace, the user can choose from one or more reports. The current Starter Kit contains only one report per workspace; the second report in this screenshot is for illustrative purposes only.



District Reports

In this first screenshot, please note the tabs at the bottom of the screen, which allow the user to visit different pages with different kinds of content. Also note, for comparison later on, that this Teacher page shows 17,000 students enrolled. The user in this case is a district administrator who has access to all student data in the district.



The next four pages are only accessible by district users, not by individual teachers.



Student Name
 Tiffany B Herbert

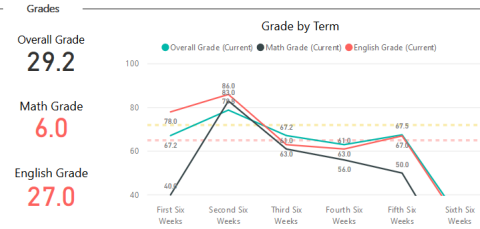
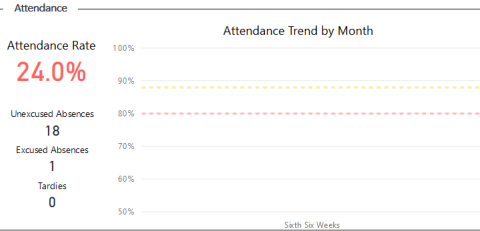
Student Indicator
At Risk

- Grades
- Attendance
- Behavior

School
Harte (Bret) Preparatory Interme
 Grade Level
Seventh grade

Guardian / Parent Information
 Name: **Rory Waldron** Address: **551 Mountain Chase Dr, Somerville TX 77236** Cell Phone: Work Phone:
 Relation: **Other** Email Address:

Subject	Code	Title	Teacher	Grade
Mathematics	MHTR07	Mathematics Grade 7 (1 Unit)	Jydia McJannet	6.0
Science	SCR07	Science, Grade 7	Joseph Zamora	50.0
Physical Health...	PEDR07	Physical Education, Grades 7-8	Jennifer Sowards	39.0
Social Studies	TSSR07	Social Studies, Grade 7	Hilary Jorgenson	3.0
Reading	LDR07	Reading Grade 7	Francisca Hamilton	27.0
	LENR07	English Language Arts And R...		50.0
Mathematics	MHTR07	Mathematics Grade 7 (1 Unit)		61.0
Physical Health...	PEDR07	Physical Education, Grades 7-8		100.0
Reading	LDR07	Reading Grade 7		63.0
Science	SCR07	Science, Grade 7		78.0
Social Studies	TSSR07	Social Studies, Grade 7		51.0

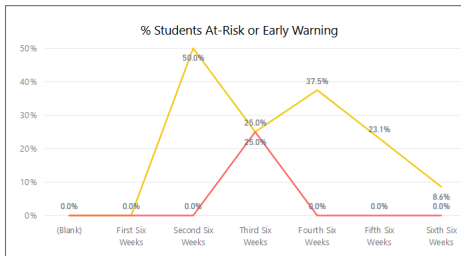
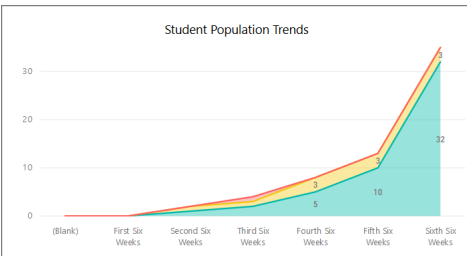


District District Averages School Student Teacher & Sections



School Name
 Bunche

Early Warning Metrics
 On Track **32 91.4%** Early Warning **3 8.6%** At-Risk **0 0.0%**



Year-To-Date Metrics

Enrollment
35

Average Overall Grade
78.3

Average English Grade
78.6

Average Attendance Rate
100.0%

Average Math Grade
78.0

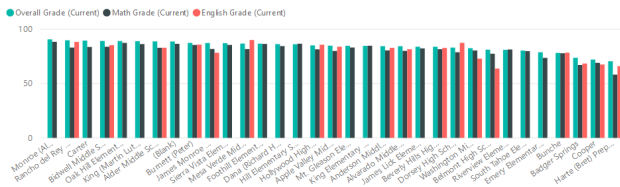
Indicator	Student Name	Grade	Status	Attendance	Grade	Math	English
●	Victor E Trevino	Eighth grade	On Track	100.0%	84.0	79.0	91.0
●	Kelvin I Holloway	Eighth grade	On Track	100.0%	82.0	73.0	87.0
●	Oliver P Powell	Eighth grade	On Track	100.0%	86.3	85.0	87.0
●	Chisum Dildy	Eighth grade	On Track	100.0%	79.7	75.0	83.0
●	Regan L Hunter	Eighth grade	On Track	100.0%	82.7	77.0	74.0
●	Jeremy D Moore	Eighth grade	On Track	100.0%	68.8	72.0	73.0
●	Cherelle I Covert	Eighth grade	On Track	100.0%	73.8	74.0	72.0
●	Jacqueline A Mccullar	Eighth grade	Early Warning	100.0%	62.8	65.0	70.0
●	Ryan A Lewis	Eighth grade	Early Warning	100.0%	63.3	71.0	70.0
●	Alfred Z Moseley	Ninth grade	On Track	100.0%	85.0	82.0	

District District Averages School Student Teacher & Sections

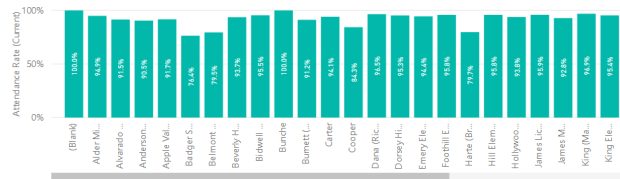


District

Average Student Grades by Subject

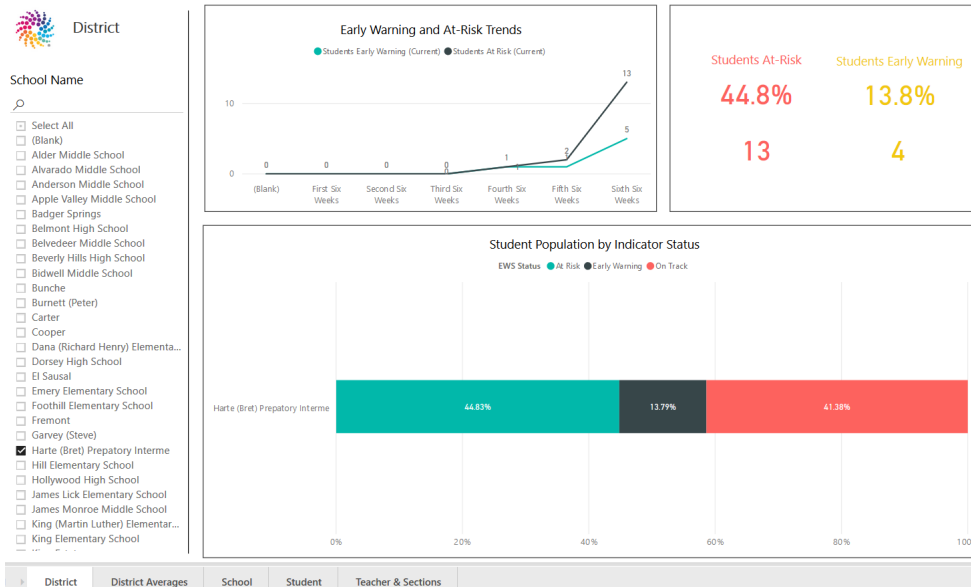


Average Student Attendance Rate



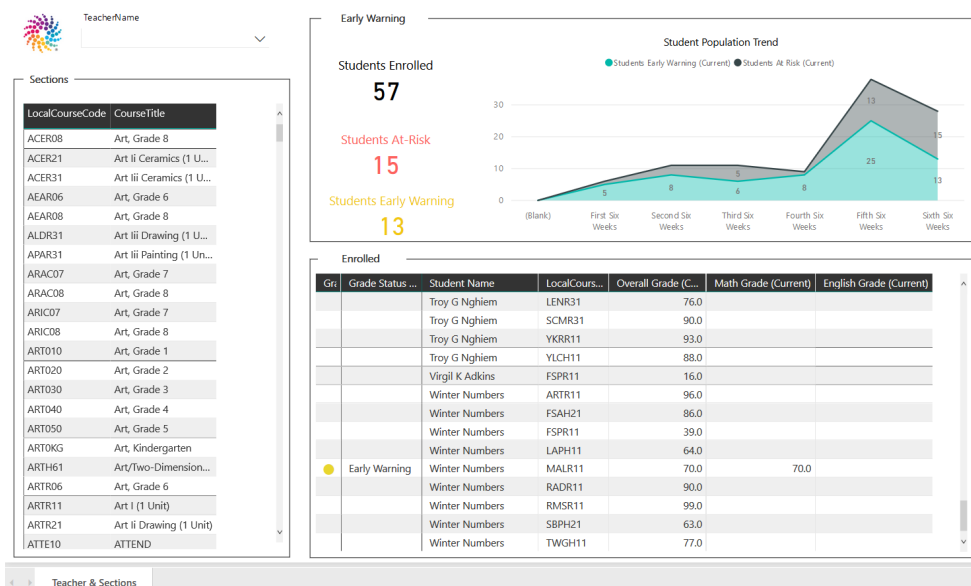
School Name	At Risk	Early Warning	On Track	Total
Alster Middle School	22	71	630	723
Alkarado Middle School	21	73	515	609
Anderson Middle School	42	118	373	533
Apple Valley Middle School	39	73	342	454
Badger Springs	49	25	30	104
Belmont High School	143	204	326	673
Beverly Hills High School	131	218	1,546	1,895
Bidwell Middle School	15	57	540	612
Bunche	1	6	28	35
Burnett (Peter)	5	5	21	31
Carter	2	12	251	265
Cooper	40	19	66	125
Dana (Richard Henry) Elementary School	7	38	414	459
Dorsey High School	142	221	1,400	1,763
Emery Elementary School	52	64	194	310
Foothill Elementary School	6	18	247	271
Harte (Bret) Preparatory Interme	13	4	12	29
Hill Elementary School	3	22	397	422
Hollywood High School	124	170	1,511	1,805
James Lick Elementary School	9	30	290	329
James Monroe Middle School	33	105	512	650
King (Martin Luther) Elementary School	7	29	225	261
King Elementary School	7	29	225	261
Mesa Verde Middle School	18	63	468	549
Monroe (Albert F.) Elementary School	3	9	296	308
Mt. Gleason Elementary School	5	16	154	175
Oak Hill Elementary School	3	15	306	324
Olive Elementary School	1	4	278	283
Plute Elementary School	1	15	393	409
Rancho del Rey Middle School	33	72	648	753
Riverview Elementary School	6	42	283	331
Total	1,065	1,993	14,159	17,217

District District Averages School Student Teacher & Sections



Teacher Reports

The one report available to Teachers is identical to the one available to District Administrators. However, note the difference in record count - comparing 17,000 in the prior screenshot to merely 57 enrolled students in this version. The difference is due to the row-level security in the data layer, which allows district administrators to see all data and (by default) allows a teacher to see a student's data only if the student is in that teacher's class.



Prerequisites

- An Ed-Fi ODS version 2.4 or 2.5, running via the Cloud ODS or on-premise.
- Microsoft Azure Subscription
- Microsoft Office 365 Subscription
- *Optional:* School Data Sync enabled and populated
- Access as an Azure Global Administrator
- Access as an Office 365 Admin
- SQL Server Management Studio (17.x)
- Power BI Desktop

- Power BI Pro License
 - To publish Power BI Desktop files to a group workspace, the user must have a Power BI Pro license.
 - More information can be found at <https://www.powerbi.com>.
- *Optional*: On-premise Data Gateway
 - If using an on-premise ODS, an Azure Data Gateway service application must be installed on the network. This will provide a secure gateway for Azure Analysis Services to query data from the ODS. This must be done before deploying the Tabular Model.

Components

There are three main categories of components that are included with this project: Azure Components, Office 365 Components, and Power BI Components. In addition, the Power BI Components depend on installation of the Analytics Middle Tier into the ODS database.

Azure Components

The entire infrastructure of this project relies on Microsoft Azure's PaaS (platform-as-a-service) offerings. These include:

- Analysis Services
- Automation

Analysis Services

Azure Analysis Services (AAS) is Microsoft's platform-as-a-service offering for SQL Server Analysis Services. Specifically, this is used to host an in-memory Tabular Model that is connected to an Ed-Fi ODS database.

Azure Automation

Azure Automation is the service framework to control Azure services, entirely from within Azure. These actions can be performed by either a manual trigger or a scheduled timer.

The Automation account that is deployed contains two PowerShell Runbooks - one for the Analysis Services schedule, and one for the Tabular Model processing. In general, these serve three purposes:

1. Suspend the Analysis Services server.
2. Resume the Analysis Services server.
3. Process the Tabular Model with new data from the ODS.

Additionally, a set of credentials are stored within the Azure Automation account to authenticate all the required commands.

Office 365 Components

Ed-Fi EWS Office 365 Groups

Two Office 365 (O365) Groups are created to match the two roles that are established in the Tabular Model:

1. Ed-Fi EWS Read All (edfiewreadall@domain.com)

2. Ed-Fi EWS Student Auth (edfiawsstudentauth@domain.com)

Ed-Fi EWS Student Auth is the group that all end users should be added to in production. The **Ed-Fi EWS Read All** group is primarily for testing purposes.

Users added to the **Ed-Fi EWS Student Auth** group can only see the data in the Ed-Fi EWS data model and Power BI reports if they are logged in with an O365 account that is associated with an Ed-Fi user Id which is associated with school(s) and section(s) in the underlying Ed-Fi ODS data. As such, developers and testers whose O365 accounts are not associated with an Ed-Fi user Id and/or reflected in the underlying Ed-Fi ODS data would see no data in the Ed-Fi EWS data model or Power BI reports. As such, users who need to see data for development and testing should be added to the **Ed-Fi EWS Read All** group.

Office 365 Groups are used instead of standard security groups because of their correlation with a Power BI Workspace. Currently, this is the only way to work with Power BI Workspaces.

Power BI Components

Power BI Components are shared in the .PBIX file format. This file can be opened and modified within Power BI Desktop, or published to the PowerBI.com web service.

District and School PBIX

This .PBIX file contains all report content - District, School, Student, and Teacher & Sections. This file is intended to be published to district and school administrators.

Teacher PBIX

This .PBIX file contains only Teacher & Sections report. This is intended to be published for teachers.

Release Notes

Version 2, December 2018

- The Tabular Data Model has been greatly simplified through use of the Analytics Middle Tier, which should facilitate easier modification in the field.
- Minor UI improvements in the visualizations