





Playbook on Preparing Your Institution's Actual Data to Support Your Ideal Equity Use Cases: A Case Study from University of Montana

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## **Executive Summary**

University of Montana (UM) and EAB embarked on a project to transform UM's data ecosystem to better support Native American students from when they apply through their post-graduation career outcomes. This project used a rigorous design process led by product and process experts at EAB, leaders at UM, and incorporating input from key UM stakeholders, including Native American students and staff.

### Practitioners and Leaders at UM



From this process we designed four workspaces (a workspace is a collection of dashboards that share a data model on a particular theme such as financial aid or employment outcomes), prioritizing the implementation of two of them during the 2022-2023 academic year:

### **Financial Barriers Identifier**



A tool for staff at UM to identify financial barriers that could impede success for Native American students.

### **Employment Pathways Generator**



A tool to identify academic and employment pathways as well as potential mentors for Native American students.

## **Executive Summary**

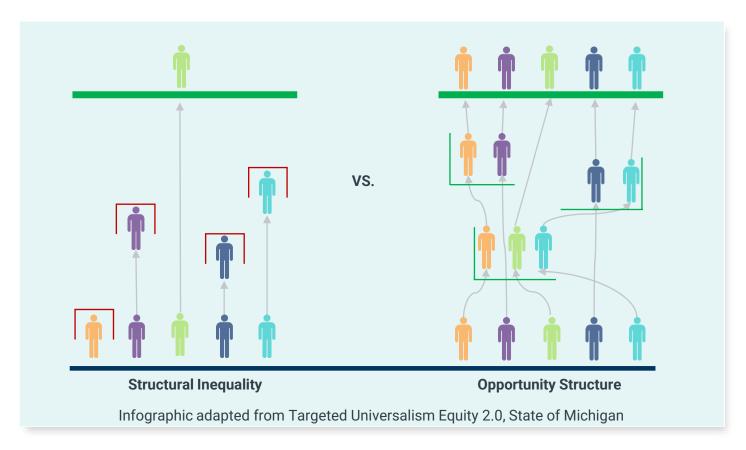
Throughout the design process, we asked users for data use cases, or specific ways they could use data to benefit Native American students and remove barriers to enrollment, graduation, and post-graduation success for these students.

We strove to apply principles of "targeted universalism," a design framework developed by john a. powell, Director of the Othering & Belonging Institute at University of California, Berkeley.



john a. powell

**Targeted Universalism** finds it essential to set a universal goal, such as friction-free enrollment, and then center on the unique challenges of specific groups in order to eliminate opportunity gaps for all groups.



## **Executive Summary**

We pushed ourselves to prioritize the most actionable use cases, such as reaching out to students who may qualify for specific funding. Through the iteration process we worked to ensure that our designs would only use data that was already available so that users could take immediate actionable, rather than wait for different units to create new business processes or change existing business processes to collect new data. The implementation process shed light on how to prepare and validate the data, and in some cases, evolve the business processes to enable the data to support the use cases.

The workspaces are powered by EAB's Edify, which is a data warehouse, governance, and analytics tool. Using Edify allowed us to bring together data from different technologies and systems to create flexible, multi-source analytics for end users.

We connected disparate data sources, such as the SIS, the Enrollment ERP, National Student Clearinghouse data, and others to Edify and normalized the data in our centralized higher education data model. Then we brought these data together into the analytic workspaces so that staff could see important connections between financial aid and housing data, alongside SIS data, and graduation and High Impact Practice (HIP) participation data alongside employment data. To get a deeper view into how Edify works, please review **Section 2** of this report.



While setting up the first workspace we chose to implement, the Financial Barriers Identifier, we ran into numerous challenges, despite having tried to only use data that we believed was already available. Here are the challenges we will explore in this document:

- Bringing together siloed data created from one-time business processes
- Determining what to do when too few variables have been used to satisfy too many conflicting business cases
- Selecting the most appropriate source of truth when different data collection methods are used for the same data points
- Dealing with different data export and variable formats
- Creating analytics tools when data definitions and metadata are not accessible
- Identifying the correct source of data for a given use case
- Flagging data points that are not currently collected, but should be

We believe that the challenges we faced will be familiar to staff and faculty at other higher education institutions because they represent challenges not only to the specific use cases in the specific dashboards we designed, but more general challenges such as how to enable users to act on insights from data that is created by the institution each day.



## **What We Built**

SECTION

### **In This Section**

- Financial Barriers Identifier
- Employment Pathways Generator

## Financial Barriers Identifier

### Overview

The Financial Barriers Identifier workspace is a tool for practitioners (e.g., financial aid staff, advisors) to learn more about financial barriers that may affect success outcomes (e.g., enrollment, retention, graduation, etc.) for Native American students at the University of Montana. The workspace includes four dashboards, each focused on one of four distinct groups among the Native American population with whom student success practitioners may conduct interventions or work to remove specific barriers:

 Admitted Students (who have not yet enrolled or matriculated)\*

- Enrolled Students (currently enrolled Native American students)
- Stopped-Out Students (students who have been enrolled at some point in the last two calendar years, but are not currently enrolled and have not yet earned a degree or credential)
- Near Max Credit Students (students who are near a maximum credit threshold after which they would be ineligible for federal or institutional financial aid)

\*The team proposed the following success metric for the tool: to improve the rate at which admitted students enroll at the institution by 1 to 4 percentage points.

### **Key Facts**

115 variables in initial design; 47 variables in first iteration of live dashboard

### Types of data

- · Financial aid data
- Student academic information
- Student demographic/identification data
- Student engagement data

### Source Systems

- SIS ERP (Banner)
- Finance ERP
- Enrollment CRM
- Housing System (StarRez)
- Student Success Management (Navigate)
- · National Student Clearinghouse

### **Example Questions to Answer with Data**

- Which students might be eligible for the Native American Tuition Waiver, but haven't yet applied for it?
- How many Native American students are close to earning a degree or credential but near a maximum credit threshold after which they won't be eligible for financial aid?

### **Example Use Cases**

### **Data Driven Interventions with Students**

Reach out to students who are potentially eligible to receive the tuition waiver but haven't applied

### **Gather Data to Inform Potential Policy Changes**

Determine how many students who are waiting for tribal funding are dropped from classes each term due to misaligned due dates

## **Employment Pathways Generator**

### Overview

The Employment Pathways Generator workspace is a tool for practitioners (e.g., career counselors, advisors) to serve Native American students by offering them context about student success outcomes and connecting them to mentors. The dashboards can help users understand how High Impact Practices (HIPs) (e.g., internships, practicums, etc.) have correlated with success outcomes (e.g., graduation, employment, salary, etc.) for Native American students at the University of Montana. The tool allows users to review outcomes related to graduation, employment, and earnings among recent\* alumni and understand the influence of their prior

participation in HIPs. Note that "recent" means those who have graduated in last five years, an adjustable definition.

We also display information about where alumni are located geographically (at the county level) based on feedback from Native American students, many of whom expressed an interest in being able to serve their community or tribe after graduation.

\*The team proposed the following success metric for the tool: to improve the rate at which historically underserved students engage with specific high impact career development activities by 1 to 4.5 percentage points.

### Key Facts

53 variables

### Types of data

- · Cohort data
- · High Impact Practice information
- Post-College employment information

### Source Systems

- · SIS ERP (Banner)
- LMS
- · Career system
- Mentorship platform (PeopleGrove)
- EMSI
- OCHE cohort-specific graduation rates
- · National Student Clearinghouse

### **Example Questions to Answer with Data**

- Are High Impact Practices correlated with positive outcomes for students? Does that correlation hold true for Native American students?
- Which employers offer placements (e.g., internships) for HIPs but haven't offered jobs to those students? How might university staff improve or reform partnerships with these employers to increase job placement for Native American students?

### Example Use Cases

### **Data Driven Interventions with Students**

Connect current Native American students to potential Native American mentors who have followed a similar path

### **Gather Data to Inform Potential Policy Changes**

Identify HIPs that are not serving Native American students equitably and determine if changes should be made to those programs



# SECTION CO

# **How We Built It and Rolled It Out**

SECTION

### **In This Section**

- We Conducted Focus Groups Before Building Tools
- Recommendations from Student Focus Groups
- How We Built It
- · How We Rolled It Out: Analytics Institute

## We Conducted Student Focus Groups Before Building Tools

Before Developing Practitioner Tools, We Interviewed Students & Stakeholders

University of Montana (UM) and EAB held four focus groups with a total of 19 total participants. From the focus groups, key themes that emerged concerned the financial aid process, student support, and campus inclusivity. In a separate report you will find themes from each focus group, associated recommendations, and a robust set of direct quotes, lightly edited for clarity.

Regarding the financial aid process, participants expressed frustration with misalignment between tribal funding and the federal financial aid process. Participants were unaware of timelines for receiving funding. They often mentioned some financial aid being taken away when other scholarships were added and not having transparency about the process.

They also cited lack of transparency in fees related to college costs in marketing materials and correspondence. Participants mentioned enduring daunting financial aid processes each term and wanted to understand how to better avoid these pitfalls for future registrations. Participants also expressed pain points around receiving support from financial aid and student accounts staff.

Participants mentioned wanting cultural competency training for every student support staff member. Participants felt that staff did not understand their uniqueness and that they are often directed to Native American Student Services instead of being served in other campus offices. Lastly, participants expressed the psychological stress of knowing they have unpaid balances while trying to navigate their academics.

Regarding advising and student support services, participants expressed having different experiences based on their major and college. Most participants use self-service for registration and campus catalogues and websites. Some participants feel advisors don't care; others feel highly supported by select advisors that participants found to be culturally competent.

Notably, all upper-class participants had double majors and expressed desire to study abroad. Participants also expressed wanting to explore different majors and a 'go with the flow'

approach to major selection, meaning that they wanted to experience some aspects of the major which would help them choose.

Regarding campus inclusivity, participants expressed being engaged on campus but not necessarily experiencing a sense of belonging. Participants mentioned campus offices often referring Native American Students to American Indian services instead of serving them directly. Some participants expressed only feeling a sense of belonging when engaging with the American Indian services, while other participants expressed struggling in spaces curated for Native American students because - depending on their tribal heritage - they may not have participated in a sweat or pow wow making them feel "not Native enough." Participants also expressed wanting their intersectional identity acknowledged, with statements such as "I am Hispanic too."

A final focus group was held with community stakeholders to provide more context for the student perspectives. Key themes included the need for better collaboration to maximize financial resources for students and reduce duplication of effort. Community stakeholders mentioned holding a calendaring day to map out how to best support students. Community stakeholders also expressed the same pain points around financial aid and campus inclusivity from their personal experiences and in helping their students navigate processes on UM's campus.



## Recommendations from Student Focus Groups



Based on the perspectives expressed by focus group participants, please find our recommendations organized by theme and by student cohort.

### **BY THEME**

### **Financial Aid**

- Tribal Funding and Federal Financial Aid Alignment
- Cultural Competency Training for Student Support Staff
- Transparency in fees related to college costs in marketing materials and correspondence
- Financial counseling for students, touching on both loan aversion as well as the psychological stress of bills

### **Advising**

Most students register for classes themselves; students meet with advisors for pins so that they can self-serve. At the same time, many students feel advisors don't care; for select advisors that students identify with, they feel highly supported. Maybe we need to explore further this mixed engagement with advising.

- Native American students expressed desire for exploration of majors and careers; perhaps a meta major model would be helpful?
- Native American students expressed desire in study abroad, which indicates a potential opportunity for institutional investment

## Staff Learning & Development, since student success hinges on staff success

- Hiring more diverse staff
- Black out days for staff to address burnout
- · Evaluating professional development and training
- Campuswide cultural competency training
- Ensuring staff have appropriate processes and resources to efficiently serve students

### **Inclusivity & Tribal Nuances**

- Consider scaling American Indian center services across campus to promote inclusivity
- Address the positioning of events designed to appeal to Native American students: some students do not feel "Native enough" to attend certain events

## Engagement vs Sense of Belongingness: which is more predictive?

Students expressed engaging with various offices and departments, yet still not feeling a sense of belonging. Before creating a strategy to increase student engagement or further surveying students on their sense of belonging, understand the relationship between the two.



### BY STUDENT COHORT

### First Year Students:

- · Clear Onboarding Checklist
- · Transparency of costs
- Peer mentoring
- Mental health support, including grief counseling

### **Upper-Class Students:**

- Financial planning
- Intentional pathways to study abroad
- · Intentional pathways to paid internships
- Mental health support, including grief counseling

**Graduates**: Engage Native Alumni to mentor students, speak at University events, spotlight in media and newsletters.

**Community**: Build professional development calendaring day to plan and share resources for students' activities.

## How We Built It

EAB's higher education data management system, Edify, allowed us to bring all of the necessary source systems together to create actionable workspaces. Edify has three main zones (Intake, Build, and Export) that allow us to bring in data, normalize it in the centralized data model, and create reports, visualize, or export that data. We can use an external tool or create reports and data visualizations in the workspaces within Edify. We also utilized Edify's data dictionary to ensure we fully documented the work we had completed. This allowed us to both document business processes and data definitions, as well as trace a data point back to its source. This functionality was key to ensuring that UM users will be able to continue to understand the data used in their analytics tools as they continue to grow and adapt their business processes and the data they collect.

### Intake

The first step was bringing data from different systems into Edify. Edify's architecture and philosophy for data transformation is Extract, Load, then Transform (ELT). This ensures faithful replication of source data with no opaque transformations between the source and the Intake zone, sometimes referred to as a data lake. ELT also ensures that all data from the source system is backed up so that we retain all data points, even those that may not seem necessary at first. This approach allows Edify to be agile in modifying and extending transformation logic as business processes evolve and implementation takes place. Extract, Transform, then Load is better for simple transactions.\*



Edify is designed to extract and store the data and metadata for all sources. This removes the requirement of having to reference source system information in separate tools. Through this ELT process, mappings are stored and configured throughout the application, which enables a single consolidated reference on the institution's data, instead of the complexity of multiple tools for multiple datasets. Edify initially maps source data into a relational database structure, preserving values from disparate sources in a streamlined data lake. There are controls in place to allow modification of the default mappings on database sources using custom SQL to format into a more controlled version in the intake as needed (e.g., filtering or masking columns).

### Build

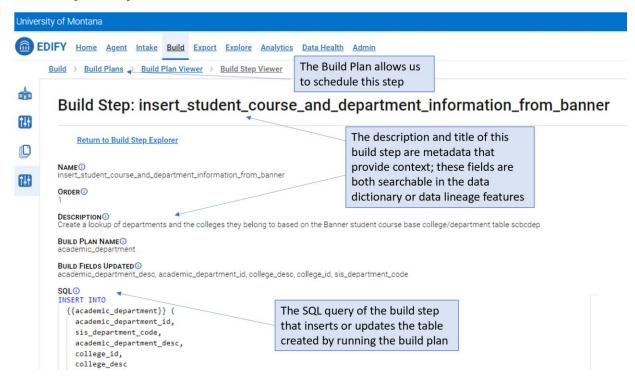
Once we had connected the source systems and loaded data from those systems into Edify, we transformed the raw data into the centralized data model. This data warehouse reporting model stores processed representations of raw source data for easy use in downstream processes and ad hoc reporting.

The data model is constructed through a metadata representation of the table as fields, unique key constraints, and indexes. Then values are populated through atomic SQL statements to insert or update values in the reporting model from the intake data. This allows for easy maintenance when business processes change.

Source: https://www.qlik.com/us/etl/etl-vs-elt

## How We Built It

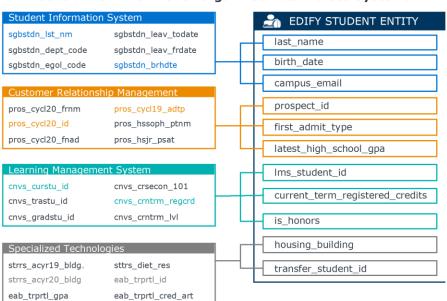
### **Build Step Example:**



Once we had mapped data to the Edify data model or created additional tables, we were able to rename complex tables and columns with plain-text names that users can easily understand (see image below for an example). We then were able to use the data to build data models specifically for the Financial Barriers Identifier and the Employment Pathways Generator.

### **Example of Data Mapping**





## How We Built It

### **Export**

The Export zone is where we can create extracts to send to other systems or analytics tools, or to create analytics within Edify itself. We chose to create analytics within Edify and created the data models that power the two Analytic Workspaces, and provisioned user access to these workspaces. These workspaces can contain a variety of dashboards, where users can build out reports for data consumers at their institutions. We created a workspace for the Financial Barriers Identifier, which contains four dashboards, and a workspace for the Employment Pathway Generator, which contains three dashboards.



### **Example**

Here is an example of a real scenario we experienced as we made decisions about how to build in some of the complex logic we needed for our analytics.

At the beginning of this project, we divided our variables into two groups, those that were simple, and those that were complex. Whether or not a student has completed the FAFSA is a simple Y/N data point and easy to validate. Whether a student is First Generation, however, can be generated in two ways (from student responses as well as calculated from the FAFSA), so it is more complex. There were also single data points with more than fifty lines of code detailing the decision tree that

generates that variable, which in UM's case was around a field required by the state called "Montana Race" to identify Native American students. The state of Montana uses this field because the federal categories for reporting race and ethnicity frequently undercount Native American students (e.g., when Native American students are classified as "multi-racial", and institutions cannot disaggregate the data back down to determine which students selected Native American

Our question was how to incorporate this logic in a way that would respect the targeted universalism framework we had chosen to inform our work, and the Edify best practices that require us to bring in data in a way that stays true to the data source system. We wanted to ensure that users could focus on removing barriers for Native American students without removing the ability for them to branch out and focus on other student groups if they saw an opportunity to extend these insights later. We didn't want to exclude non-Native American students at the intake level, because this would mean that the insights in the data tools couldn't be applied to other groups in the future, and it would also limit other reporting from our data warehouse in the future. This is a bad idea if we are trying to create an easily extensible data model: it's better to have the data and not use it than to leave it out and need to get it later.

We chose to incorporate this logic for these critical fields and their decision trees within the centralized data model, or our Build zone. This allowed us the greatest amount of flexibility for any future changes and within the current analytics. For example, in the Financial Barriers Identifier, because we didn't remove students from the population if they weren't Native American (we instead made Native American status a default filter), practitioners can use the filters for other groups as needed, in line with the Targeted Universalism approach.

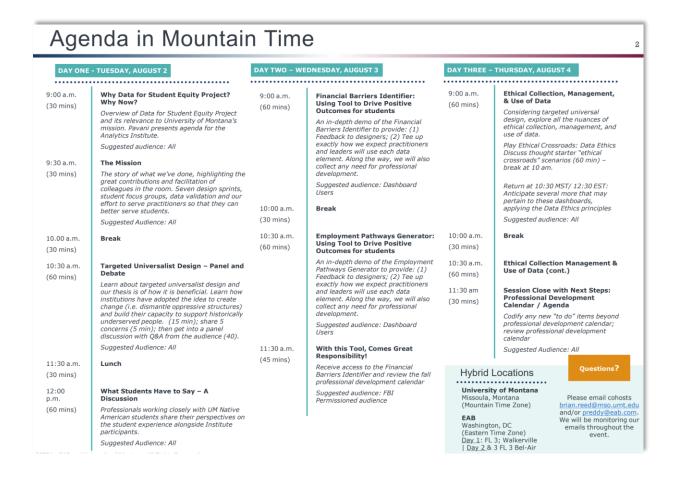
## How We Rolled It Out: Analytics Institute

### Thoughtful Tools Require a Thoughtful Rollout

The objective of our Analytics Institute was to prepare University of Montana's leaders and practitioners to leverage - this fall - the first tool that we developed in the Data for Student Equity Project: the Financial Barriers Identifier.

### Beyond tactical "tool" training

After bringing 30+ attendees up to speed on the Data for Student Equity Project, Brian Reed posed a question to help all parties get into the right frame of mind for approaching the Institute with as much student-centricity and empathy as possible: "What were you thinking or feeling in your first week of college?" This set the tone for session participants to understand the use cases of the Financial Barriers Identifier from the lens of helping students overcome systemic and process challenges. Throughout the institute, we discussed what creates a sense of belonging or exclusion in the college environment and the risks of stereotype threat, as well as how to minimize them in our interaction with students.



### **Next Steps**

The team attending left the three-day Institute craving additional professional development. They expressed the need for regular office hours to familiarize themselves with the practical use of the tool during the throes of the fall term, opportunities to ideate interventions, including how to leverage the student success management system on campus (Navigate) and a chance to demystify the basics of financial aid advising. Project leaders connected to create a fall professional development calendar encompassing six sessions across three tracks to provide space to cover these topics.

**SECTION** 

# three

## What We Learned

SECTION

### **In This Section**

- Data Challenges and Our Responses
- Results from One Outreach and More To Come!
- Key Recommendations: People, Process, Technology
- Curating a Belongingness Agenda for Native American Students
- Glossary of Data Terminology

3

### What We Learned

"Housekeeping, the art of the infinite, is no game for amateurs." - Ursula K. Le Guin

During the process of implementing the Financial Barriers Identifier tool, we unearthed multiple data challenges, including data governance challenges. Data governance, like housekeeping, can feel like a time-consuming, often thankless task with no end in sight. Well-governed data and solid communication practices, however, can help users access and use accurate data even in a world of shifting business processes. We learned about siloed business processes, unclear sources of truth, and areas where units were sharing data without the correct context. Many of our challenges were addressed through establishing lines of communication, improving documentation through Edify, and generally aligning with data governance best practices.

# The Continuous Improvement Cycle of Data Governance: Establishing Policies and Processes to Aggregate, Standardize and Improve Campus Data



In the following pages we will dive into the various data challenges that we experienced, along with how we responded to them to bring the Financial Barriers Identifier workspace to life for practitioners and leaders to serve Native American students at UM.

### Bringing together siloed data created from one-time business processes



Challenge

At UM, like many institutions, a large number of data siloes have been created by business processes and technologies that are designed to simplify the process of a task that a student will do once. Fall Registration for incoming students, for instance, is not as repetitive as some processes (while it occurs each year, it typically occurs once per student), so it isn't given the same level of time and attention as processes such as course registration which happen on a much greater scale. This means that in these situations, the process for creating the data, figuring out where they are stored, and how often they're updated, is often determined by singular actors within institutions who do not understand the dependencies or effects of those decisions for others who may try to use those data for other purposes.

Continuing the registration example, specialists within the Registrar area may be able to use information gathered at registration to infer other data points, like intent to enroll. At some institutions students can register to audit classes, or to take them for no credit, but the student will still show as "Registered." If Admissions is looking at registered as a simple Yes/No variable without that business process-specific information, they may interpret a "Yes" as a good placeholder for Intent to Enroll. This is a situation where admissions will believe the student is coming to the institution, while registrar specialists will know that student is most likely not going to attend. Situations like this abound, especially when business processes within departments shift without interdepartmental communications.

### **Our Response**

As a part of our implementation, we conducted in-depth interviews with data specialists from every area of the campus where data was created that would eventually appear in the workspace. We recommend this process as a part of the preparation for any implementation of data dashboards to ensure that users will have a clear understanding of how to act on insights from the data. For this project we generated a **Data Dictionary** that contains definitions for each metric in the workspace, as well as recommended actions for each metric. Prior to the workspace launch the relevant departments at UM vetted this glossary to confirm where the data were created.



Response to Challenge

Determining what to do when too few variables have been used to satisfy too many conflicting business cases



Challenge

Missing or deficient data definitions can create challenges around user documentation, as future users don't know the business reasons supporting the original technical definitions. Users/Designers often react to this lack of documentation trying to force their new data to mimic previous work at the institution without understanding the unintended consequences that can entail for their different use case.

Our team's higher ed data experience informed our approach to this challenge. A telling example is from a department that requested information from admissions to do outreach to students for upcoming events prior to their registration. In building the application, designers simply mimicked existing admissions report counts to ensure user confidence, but those counts included admitted students who had already cancelled (i.e., these students would not matriculate that term). The original document included the cancelled students because it was intended to be used by staff and leaders who wanted to understand total admissions trends, but when this logic carried into an outreach use case it resulted in upset prospective students who were receiving what they perceived as frivolous emails about events they were not interested in. This resulted in multiple calls to admissions, and frustrations around the confusion. Using data from an incompatible use case ultimately ate up student and staff time, damaged user confidence in the reports, and slowed the progress of the new initiative significantly.

Data curators and other data users should ensure that each data point is tied to its intended use case and should use clear and detailed names to ensure that confusion is reduced. "Admitted Students for Fall" feels intuitive, but variables names like "Total Admitted Students for Fall 2022 (Including Cancels)" provide more guardrails for future designers/users to better distinguish between variables.

### **Our Response**

The way we avoided this issue at UM was by documenting when our use case was substantially different than one being used by another report. This allowed us to argue that there should be two variables when needed, and made it clear we were not making redundant requests. While this can be a challenge for administrators and policy makers to switch from looking at variables like "Admitted Students" to variables like "First Time Current Admitted Students for Fall 2022", the additional delineation from other variables is critical to reduce confusion.



Response to Challenge

Selecting the most appropriate source of truth when different data collection methods are used for the same data points



At UM, we had a surprisingly challenging time determining which students should be counted as Native American. In UM's systems, students can update their own data throughout their time at the institution, and the updated data may differ significantly from the original intake forms, including wordings and description of terms. This can lead to data quality inconsistencies that data users need to account for with advanced logic or staff/faculty user training.

Challenge

We had considered using a de-duplicated calculation of students who:

- indicated they were Native American on intake forms;
- recorded a tribal affiliation in UM systems and/or;
- · applied for the Native American tuition waiver

When we began building the Financial Barriers Identifier, we saw that the data was sometimes confusing if indicated that they were Native American in their enrollment paperwork, but then updated their race, ethnicity, or tribal affiliation data in UM's internal systems. Because the language around race/ethnicity was not consistent in the ERP and the CRM systems, this led to confusion around which should be considered the correct intake time for the data point.

### **Our Response**

In UM's case, we updated the language to be consistent in both data collection areas, but if that had not been possible, we would have had to pull the two data points apart and store them as different data points. We chose to use the definition of Native American from Montana's "Montana Race" classification to record as many Native American students as possible while still allowing users to validate the number against other systems. Our calculated field, while possibly identifying a few more Native American students, could have damaged users' trust in the data if they couldn't replicate that data point with any other tool. A robust data dictionary that clarifies the specifics of a variable compared to other similar variables is essential for dealing with this type of challenge in a way that won't create further issues down the line.



Response to Challenge

### Dealing with different data export and variable formats



Challenge

We knew from prior experience that different export formats can cause significant frustration to users. This occurs especially when users try to combine data because critical information that is common for students, like major, college, or demographic information, may not be available in all datasets, making disaggregation and action-oriented data processing difficult for offices that have business processes organized around this common information. Because we were combining data from five datasets for the Financial Barriers Accelerator, and eight datasets for the Employment Pathways Generator, this was a top-of-mind issue for our team.

For example, reviewing data related to students' gender may sound simple, but the fields might be very different, for example:

- Male, Female, and Non-Binary
- M/F
- Yes/No (for example, when asking if a student is Male for selective service registration).

These are all reporting student gender, but because the data are in different formats, we don't know how to analyze or interpret these different responses.

When it comes to variable formats, one of the most frustrating is time-specific information, as time-specific data is collected and represented differently across so many different systems and is one of the most difficult variables for most users to convert and manipulate in other systems like Excel. Date formats that include or exclude years can obfuscate key context for data, and date formats that include minutes and seconds can cause undue frustration to users when filtering, graphing, or searching within data, and can pose significant challenges to users to remove or reformat that data.

### **Our Response**

We used Edify to enforce standardization across exports for variables that we knew were likely to cause this kind of user frustration. We also chose to update some formats based on how much granularity users desired within fields like Date (e.g., including hour or minute data) or GPA (e.g., including more or fewer decimal points. Without a data warehousing solution like Edify, the alternative path would have been to require new vendors to have all exports adhere to the institution's specific requests around the desired level of granularity for storing or displaying specific data points, which puts additional burden on IT in RFP and procurement process, without the guarantee that vendors and systems will be able to comply.



Response to Challenge

Creating analytics tools when data definitions and metadata are not accessible



At UM, the absence of data definitions and metadata presented multiple challenges as we created analytics tools. One representative example of this issue was trying to understand which students are considered First Generation. It can be challenging to zero in on exactly which systems and tables the data originally came from. First Generation data is collected in two places:

- 1) On the application (e.g., "are you a First Generation student?")
- 2) On the FAFSA when a student fills out the highest education level for each parent (institutions then calculate first generation status).

The fact that this information is collected in two ways may not seem like much of a challenge, but if any of the following issues (among others) occur, users might suddenly be unable to use or access First Generation data, and might not even realize that for some time:

- If users cannot determine which way First Generation status is being calculated,
- If Admissions no longer collects that field or drops the data from it,
- If Financial Aid changes their business processes;

Users would need to review and find all the places that First Generation status is referenced within the code. Unfortunately, in code that EAB's data experts have reviewed from across institutions, there are typically very sparse comments on these ETLs, which means if you don't already know that first generation can be calculated both ways and know the specific fields and tables they come from, you won't be able to locate those parts of the code without hours of trial and error.

Many times, data definitions are heavily vetted with the requesting stakeholders at the time of the request but aren't sufficiently documented to allow users and report writers to build on that work. This manifests in a lack of technical documentation around the logic used in the ETL processes and verification queries. Documentation should provide commented code and clear dependencies on where functions and ETLs are used as well as which filters affect which metrics and tables. Due to the sprawl of technology, these technical definitions are often only documented within the actual queries that do the ETL. The ETL queries can be hundreds or even thousands of lines of code, written in over a dozen programming languages. This creates significant stress on university technical leads to understand how to treat each user example, and whether they are treating them appropriately.

### **Our Response**

In Edify, each intake, build, and export step is documented, and users can track the data lineage and find the metadata for every query that is looking for First Generation status, transforming a task that at best could take hours and at worst was impossible into a quick search and a few minutes of reviewing SQL.



Response to Challenge

Identifying the correct source of data for a given use case



Challenge

At UM, in our initial review we found housing information contained in the ERP, CRM, and Housing System, and had to unravel which was the appropriate source of truth to load into the warehouse. Some housing information was on a delay of up to three days, and not all student-facing professionals were aware of that delay. This was leading to student confusion, staff frustration, and an overall lack of trust in data at the institution.

Because of the rapid expansion of technology point solutions in higher education, data users have devised a myriad of ways to manually move data from one system to another, either through re-entering data individually or through regular uploads. Understanding these existing inter-departmental collaborations to track back to the actual source of record for a business process can be frustrating, as many users in departments are not familiar with the various ways that data is generated within their own systems.

To make matters worse, this transfer of data creates additional data points that can deepen the confusion, most commonly time-specific information that relates to when the data was entered into the system (not when the data was created; an important item that can be lost in this data transfer).

Further challenges around issues like available licenses, access, and training on the different systems can also stifle the flow of information in cases like the above.

### **Our Response**

Our team conducted data process and transfer mapping around fields that existed in multiple systems like housing information. We identified where the data was created and how it was filtered to the other systems, and then built connections directly to the source where it was created so that ultimately those other manual entries could be discontinued.



Response to Challenge

### Flagging data points that are not currently collected, but should be



Challenge

In our initial design of the workspaces, we believed that we had only included variables that were already available, but after conducting more in-depth interviews we discovered that some of the data points were in systems that did not collect Student IDs, or that some of the data points were available only for certain cohorts because individuals were manually compiling the information from paper forms. The datasets we intended to analyze and represent on the dashboards included multiple years; missing Student IDs or cohorts would have been impossible to cure without hundreds of hours of manual work.

Many data points which would otherwise be regarded as critical business intelligence are simply not collected at major universities, or are collected in non-queryable formats, such as paper forms or in Google docs with anonymized counts for given categories. There are Survey Monkey or bootstrap systems like Food Pantry check-ins and barebones tutoring systems that don't associate data with Student IDs.

Withdrawal information is a common example of incomplete data; most withdrawal processes were created to ensure that students would be aware of their financial responsibilities at their time of departure vs. using the process to generate data that can be analyzed to improve the institution. Thus, many institutions fail to send exit surveys to students, or do so sporadically and on paper forms, even though this information could provide valuable intelligence on why students stop out or otherwise leave the institution. The exit process is an example of a process where multiple departments need to be involved and where existing technology mismatches can force an overly narrow approach that does not result in data collection for strategic review.

### **Our Response**

A data solution cannot create new data that do not exist without the help of people and processes. When we encountered situations where data "should" exist, and users were surprised to see that it did not, we documented those instances and shared them with the leadership team on the project. University of Montana uses Navigate as an SSMS. The institution was able to rapidly collect some new data through Navigate's Survey tool.

We recognize that business processes cannot be added or changed instantly in many cases but being able to articulate why certain data points are important to collect and how users plan to apply insights from that data can help to make the case for collecting these data points consistently.



Response to Challenge

## Results from One Outreach and More to Come!

Despite the challenges, our first intervention has made a significant impact

The Financial Barriers Identifier workspace came to life for practitioners and leaders in early August of 2022, as we rolled out the tool during a multi-day professional development event, we called the Analytics Institute. Through the month of August, the team familiarized themselves with the four dashboards in the workspace as well as how to use Navigate, UM's student success management system to outreach to Native American students at UM.

In early September, with the support of UM's most senior leaders, one practitioner carefully outreached to students who appeared eligible for the Montana tuition waiver. Based on this one outreach, nine additional students applied and received full tuition waivers.

## Leadership is "All In" on Dynamic Tools



Our enrollment and retention efforts must be a combination of informed, empathetic professionals equipped with dynamic analytic tools.

Vice President of Student Success

### **Early Results from Early September Adoption**

9:1

Additional Students who Applied and Received Full Tuition Waivers from 1 Outreach \$49k

Student Tuition Alleviated from Native Students because of the Outreach 15

Additional Outreach Points Planned for the Semester

There are 15 additional outreaches being planned across the balance of the semester. In addition to specific interventions for priority low-income and historically disadvantaged students on financial aid education, some outreach examples include the following:

- (1) Completing FAFSA applications for the 2023-24 academic year
- (2) Registering for spring courses
- (3) Applying for tribal funding
- (4) Resolving holds
- (5) Managing Satisfactory Academic Progress

## Key Recommendations: People, Process, Technology

### Data For Student Equity Project Proof-of-Concept Yielded Several Learnings

UM and EAB designed 4 data solutions, fully implemented one of them and staged the next one. In this process, we validated hundreds of data points. Based on these perspectives, please find our recommendations organized by theme.

### **PEOPLE**

This project reinforced our belief that it is vitally important to invite the right stakeholders to the conversation when creating analytics. Consider the following:

- Who will create the analytics?
- · Who creates the data used in the analytics?
- Who will use the analytics?
- · Who are the analytics intended to benefit?
- What do those beneficiaries believe they need the most?
- · How will we measure success?

These questions, among others, should help you determine who should be involved in your conversations around creating equity analytics tools.

### **PROCESS**

As mentioned in our challenges and solutions, when designing analytics try to create a list of all the data points that will be needed for the analytics as early as possible. We were very glad as a team that we incorporated robust "design sprint" methods to align on what our users needed in general. We also found it important to refine the list by:

- · What is the use case for each data point?
- Which data points are available?
- Which data points are not straightforward (e.g., are not Boolean or Y/N variables)?
- How frequently are the data updated?
- Which data points will be used to filter information, and which will be used in reports?
- Which department or unit owns the business process for creating each data point?
- What is the business process for creating each data point?
- Is there more than one process for any of these data points?

### **TECHNOLOGY**

### **Data models**

If the institution expects any changes or add-ons to a given analytics tool in the future, even if not in the near future, we recommend making the data model scalable and extensible. This will save effort in future when the request from users to add additional data points or data sources occur.

Data models should be as intuitive as possible so they can be modified by any other authorized users and enable additional modifications and new dashboards to be created with ease.

This proof-of-concept and associated data models have laid a strong foundation for pursuing the additional data solutions we prototyped as a team.

### **Analytics Best Practices**

By default, analytics should include drill-ins – additional relevant details – for all data points, unless there is a good reason not to include such data (for example, if the users of that tool should never see student-level data). Adding drill-ins allows for easier data validation and more user-friendly reporting. It also makes reports more actionable. For example, if a metric shows how many students have a current hold, showing the list of students with their holds allows a user to contact students with holds and give them information or resources they may need to clear them. In fact, during our discovery process, we learned that seeing the information in student list form was the top need expressed by practitioners to allow them to act on the information in the analytics.

When creating analytics at the student grain, we recommend adding a filter for student ID to allow users to easily validate all data for an individual student. The exception would be if users should not see individual student information.

### **Implementation Best Practices**

- Start small make the data model extensible but limit the variables in your initial design and build out later.
- Consider robust user-training and professional development a key part of implementation and roll-out to generate the best possible student outcomes and for continuous improvement.

# Curating a Belongingness Agenda for Native American Students



### Student Success is Ensured through Staff Success

To create a sense of belonging for Native American students, we must first reflect on Student Support Staff Success as well as community stakeholder engagement and collaboration. Student Support Staff need the appropriate professional development, resources, and processes to ensure they can serve all students. There also needs to be more collaboration with community stakeholders to assist with resources and curated support.



Participants often shared out how they feel a sense of belonging in the Payne Center. One student jokingly mentioned that their personal office is located there because they enjoy the lighting, atmosphere and representation. While Native American students did mention engaging with other offices and departments on campus, the overall sense of "belonging" was lacking. Further, students referenced sometimes not feeling a sense of belonging even in spaces curated for Native American students.

We must remember that no group of students is a monolith, and we will need to rely on virtuous feedback loops to ensure all student voices are elevated. We recommend creating a group of Native American Student Voices that invites students from all backgrounds, blood levels, and reservations to share out their experience and needs, much as we have done in the focus group series.

### **Student Belongingness Plan for Native American students:**

- Build feedback loops to cultivate a space for having difficult dialogue on campus. What feedback loops will UM set in place to ensure the Native American student voice is heard and readily acted upon? What feedback loops will UM set in place to capture staff and faculty voices in supporting Native American students? We recommend Town Halls, web pages, campus surveying, quick polls and focus groups.
- 2. Run a multidimensional, race-conscious campaign that acknowledges and celebrates what it means to be a UM student. This is to address implicit biases of what traditional/majority students look like on campus.
- 3. Audit and reform campus infrastructure to support and infuse the Native American student experience in all aspects of campus culture

# Curating a Belongingness Agenda for Native American Students continued



Until institutions create a campus culture, where programs, processes, and services are seen by Native American students as inclusive and inviting, taking services to those spaces where Native American students do feel a sense of belonging and community is essential. In keeping with a targeted universalism framework, this might include having Financial Aid office conduct FAFSA and scholarship completion events or conducting career services workshops, like resume review, in those physical spaces where Native American students feel their greatest sense of community.



At the same time, the entirety of campus must engage in a deliberate learning that educates all members of campus on the historical and contemporary experiences of Native Americans, and how they can then create policies or programs that are more culturally responsive and change or eliminate those that prevent Native American students from fully participating in the campus experience. While this may not eliminate all barriers to Native American student participation and their wider sense of belonging, it is a commitment we must make if we are serious about creating communities where all students feel seen, heard, and that they belong.

## Glossary of Terms

### **Data and Analytics Terminology**

- Connector: A set of intake rules that allow a source system's data to be processed into Edify's centralized data model
- CRM: Customer Relationship Management. Common higher education CRMs include Slate, Salesforce, and others.
- Data Model: A data model is a representation of the relationships between different datasets and data elements that can be used to power analytics.
- Data Warehouse: A centralized repository of information from different source systems that can be used to create reports or analytics.
- ELT: Extract Load Transform. ELT is more appropriate for data warehouses because it can be used for large datasets and for structured and unstructured data.
- ERP: Enterprise Resource Planning software
- ETL: Extract Transform Load. ETL is better for processing smaller datasets that require complex transformations.
- Metadata: Metadata is information that helps to give additional context and information to data. There are many
  types of metadata, and these can include things like how the data was created, who created it, or key words
  about the data.
- Normalization (as in data normalization): Normalizing data refers to organizing data within a database logically in such a way that data will continue to make sense as records are added, deleted, or updated.
- SIS: Student Information System (common examples include Banner, PeopleSoft, and others)
- Validation: Data validation is the process of comparing data points to a system of record and ensuring that there
  are no errors. This helps data staff to find issues with their queries, with the source they're using for the data, or
  with the mechanism by which they are updating the data.
- Workspace: In the context of Edify, a workspace is a topical area of data exploration, which can contain a variety of different dashboards. Workspaces can be permissioned at the user level with the Edify tool.

### **UM Terminology**

Visit the <u>Data Dictionary</u> we created for this project at the University of Montana.



s Montana's flagship university, the University of

Montana (UM) offers a college experience that is broad and deep, theoretical and practical, globally focused and community-based, challenging and rewarding. Located at the base of Mount Sentinel and on the banks of the Clark Fork River, students study not only at our mountain campus, but also around the entire state.

### The Native American Focus

Inclusive excellence is an ongoing moral imperative, an ethical obligation, and a matter of institutional survival. As a public-serving institution, we are committed to access and equal opportunity. Shaped by what we have learned from our Indigenous colleagues and friends, UM is committed to be simply the start of a long journey of success that lies ahead for Native American students.

### **About The Project Lead**



### Brian Reed, Ph.D.

Dr. Reed is a first-generation college student from the East Kentucky coal fields. As a graduate of Berea College, Appalachian State University, and the University of Virginia, Dr. Reed has dedicated his career to the access and success of students historically excluded from postsecondary education. Dr. Reed currently serves as the University of Montana's Associate Vice Provost for Students Success.



### **About The Authors**



### **Matthew Dreitlein**

Matthew is passionate about the power of data to tell stories. In this project, he has served as the Technical Lead and Dashboard Designer. He has spent the last 10 years in higher education within Admissions, Institutional Research, IT, and Student Success, and has enjoyed mining insights, better understanding business processes to create UM data, and ensuring the highest data quality.



### Brad Hall, Ph.D.

Blackfeet educator, researcher, historian who was raised on the Blackfeet Indian Reservation outside of Browning, Montana, Dr. Hall has committed most of his career to improving education systems on the Blackfeet Indian Reservation. His current appointment is at the University of Montana-Missoula as the Tribal Outreach Specialist. This role supports university efforts to increase Native student access to fouryear degrees and beyond.



### **Dawn Ressel**

Dawn's work at the campus level, across many campuses, and the state board governing level fortifies her belief that with ethical use of data and solid data governance, data should be accessible to all who need the information to advance student success and other institutional priorities.



### **Zach Rossmiller**

As Associate Vice President and Chief Information Officer, Zach is dedicated to providing forward—thinking ideas that unify, empower, and establish IT leadership in higher education. He is eager to collaborate with other committed colleagues to make forward progress at University of Montana.



e help schools support students from enrollment to

graduation and beyond We work with more than 2,500 institutions to drive change through data-driven insights and best-in-class capabilities. From kindergarten to college to career, EAB partners with leaders and practitioners to accelerate progress and drive results across five major areas: Institutional Strategy, Marketing & Enrollment, Student Success, Data & Analytics, and Diversity, Equity, & Inclusion.

Our mission is to make education smarter and our communities stronger. We believe that we can change the world—with our partners, we are improving education and thereby strengthening communities across the nation and around the globe.

### **About The Project Lead**



Pavani Reddy, J.D. & MBA

As a Principal for Public-Private Partnerships with EAB, Pavani leads this Data for Student Equity Project, in an effort to bring innovation to the forefront of our collective work toward a future when race, ethnicity, and income no longer predict success.



### **About The Authors**



### Virgilio Larralde

Virgilio is a trained economist and a proven technical leader with a passion for helping products and businesses thrive with forward-looking solutions. Throughout his tenure at EAB, Virgilio has developed, coordinated, and led an implementation model to facilitate the delivery of enterprise DaaS (Data as a Service) solutions to partners in higher education.



### Brittany Motley, Ph.D.

As a Director with EAB, Brittany serves as the Principal Consultant for Moonshot for Equity, where she provides leadership development, change management, and student success strategies focused on building an inclusive culture for all students.



### **Emily White**

Emily leads Product
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