

NEW INSIGHTS IN EDUCATION FUNDING

How do we use data to inform future practice?

Our primary question centers on how educational grant money is distributed to schools.

We are also examined different ways success is measured and how we can use data analysis to inform future grant writing and management practices.

Our Team

To better address the usability of our analysis, we composed an interdisciplinary team of data analysis and design researchers. Our team includes students and faculty members from Otterbein University Department of Business, Accounting, and Economics, as well as the Columbus College of Art and Design's Design Research program. The team members are Jacob Watkins, Grayson Rudzinski, Dr. Michael Levin, and Mike Compton.



How Are Grants Distributed and Measured?

Originally we were informed that the federal education funds were distributed according to income levels. However, our analysis revealed that grant money does not follow a distribution pattern based on income levels. Instead, the data demonstrates that a priority is given to research and development. What's more, successful fulfillment of grant requirements is measured through self-reporting dichotomous scales that yield little actual insight into a program's true effectiveness. The result of these two insights is that successful programs have little chance of scaling because they are constantly competing against a preference towards new research.

Our analysis leads to insights and recommendations that grant money should follow a new distribution pattern based less exclusively on new research on more balanced towards scaling past successes and experience. Furthermore, we want to show that incompatible assessment rubrics are a source of unnecessary complexity, while dichotomous self-reporting scales are not even capturing the results of these various assessment rubrics.

To make sense of our analysis, we adopted a user-centered research approach that placed priority on empathy for the user of the data, namely the grantors and grantees. We structured our findings inside the graphic model representing the environment of a grant management lifecycle. This allowed us to map key moments where our findings could offer valuable opportunities to our primary user, the grant facilitator and manager.

Our Data

The primary data set comes from the FFIS (Federal Funds Information for States) Grants Database. This data set contains descriptions of each of the grant amount (\$) and type (#) for each of the eight categories for each state.

Our Methods

We began our analysis by discussing the data set with subject experts to help frame our central questions. We defined a subject matter expert as a person who has had extensive professional experience as either a grantee or grantor. We also used secondary research to verify insights. This preliminary research uncovered several key issues with our data set.

1. There is a prohibitive complexity that creates barriers to lean staffed school districts
2. Self-reporting dichotomous "yes/no" assessments little authentic measurement and insights into which grants were successful and why.
3. The belief that state-by state poverty levels were the most important factor in distribution of funds.

Our Subject Matter Experts

Kimberly Pietsch Miller
Chief Academic Officer at Dublin City Schools, Dublin Ohio

Dustin A. Pyles
Education Grant Facilitator & Policy Advocate for Vaza Consulting, Columbus Ohio

Lana Rucks, Ph.D.
Principal Consultant, The Rucks Group, LLC, Dayton Ohio

Diane Nance
Director of the Office of Grants and Sponsored Programs, Otterbein University

Framing our Analysis

After speaking with experts, we gathered the descriptive statistics of each variable to better understand the current situation. Then we broke the state variable down into 50 individual data sets with all other variables, and then took the descriptive statistics from the newly generated data sets.

Data Analysis

We then took a stratified sampling approach for the state variable with a 95% CI and a ME of +/- 3 giving us 1,000 entries, because with over 450,000 entries of data everything is statistically significant. The stratified sampling takes the percentage that represents the state in the same way they are in the population. Our selected data was from a systematic sample of the strata, using a random number of 6 to start in each state, going every 17 entries. We then used a cross-tabulation with a chi squared to look at the counts of grants received in

the R&D, Major Program, Agency/ Department granting the funds, and State. The post-hoc analysis was a Cramér's V to test the strength of the relationship of each variable, and compare the six different tests. Finally we used a n-way ANOVA to test the means of the levels, and their individual levels. A issue arises when we run a logit regression for States, Agency/ Department, R&D and Major Program in comparison with Reportable Condition and Material Weakness. We found that they could not predict the outcome for the variables.

Univariate Analysis of Variance

Variables	Significance (α = 0.05)
R&D vs. Major Program	0.000
R&D vs. State	0.000
R&D vs. Agency/Department	0.001
Major Program vs. Agency/Department	0.060
Major Program vs. State	0.000

Count of Category Name Major Program v. R&D

	Non Major Program	Major Program	TOTAL
Not R&D	265,487	127,475	392,962
R&D	9,558	72,457	82,015
TOTAL	275,045	199,932	474,977

Sum of Amount for Major Program v. R&D

	Non Major Program	Major Program	TOTAL
Not R&D	\$158,188,102,732.00	\$794,526,485,988.00	\$952,714,588,720.00
R&D	\$3,778,014,874.00	\$29,032,318,538.00	\$32,810,333,412.00
TOTAL	\$161,966,117,606.00	\$823,558,804,526.00	\$985,524,922,132.00

Cross-Tabulation Analysis

Variables	x2 Value (α = 0.05)	Cramér's V Post-Hoc
State vs. Agency/Department	0.000	0.337
R&D vs. State	0.000	0.365
R&D vs. Agency/Department	0.000	0.325
R&D vs. Major Program	0.000	0.241
Major Program vs. Agency/Department	0.001	0.150
Major Program vs. State	0.162	0.242

Sum of Total Federal Expenditures

	Non R&D	R&D	Grand Total
Non Major Program	\$211,556,975,825,984.00	\$29,284,967,473,491.00	\$240,841,943,299,475.00
Major Program	\$33,090,952,161,417.00	\$169,474,850,861,660.00	\$202,565,803,023,077.00
Grand Total	\$198,759,818,335,151.00	\$244,647,927,987,401.00	\$443,407,746,322,552.00

Grantors

Federal Agency
Agencies who create grants for funding schools, districts, and programs.

Charitable Organization
Non-profit organizations founded to fund school programs through charitable giving.

Business Partner
Businesses who contribute matching funds or in-kind support.

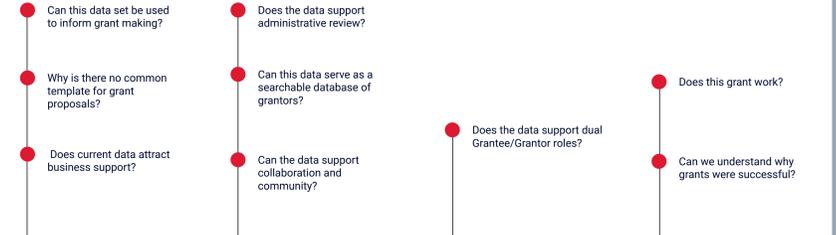
Grantees

Decision Maker
This individual is responsible for the results of the grant. Their job is to evangelize their grant proposal and communicate with other grant partners.

Managers
These individuals act as the bridge between the Decision Maker and Content Generators. They handle day-to-day decisions about creating and implementing the grant.

Content Generator
Content Generators are authors and creators responsible for determining the goals and purpose of the grant application.

Data Analysis in the Grant Lifecycle



Grantor Goal: To create a grant program.	Grantor Goal: Select/approve grantee(s)	Grantor Goal: Get progress updates on grant	Grantor Goal: Understand and communicate grant results
BUILD	CHOOSE	IMPLEMENT	EVALUATE
Grantee Goal: To understand school/program needs.	Grantee Goal: Craft a strong grant proposal	Grantee Goal: Meet terms of the grant	Grantee Goal: Measure grant impact

Our Key Findings

As we dove in to the data and experience of each stakeholder involved in the grant writing process, a few key findings stood out as the most relevant takeaways. These themes helped us create recommendations.

Our key findings are as follows:

1. "New" is preferred over successful. The belief that state-by-state poverty levels were the most important factor in distribution of funds was disproven by statistical analysis. The grant money does not follow a distribution pattern based on income levels. Instead, the data demonstrates that the most grant money is awarded to proposals that promise new research and development.

2. Current Assessment is Statistically Irrelevant. A issue arose when we ran a logit regression for States, Agency/Department, R&D and Major Program in comparison with Reportable Condition and Material Weakness. We found that they could not predict the outcome for the variable, which shows the unpredictability of the data.

3. Currently grant recipients self-report their success and compliance according to a dichotomous scale of yes or no questions. Testing which variables will lead to successful completion of grants yield no statistically meaningful information because 90% of recipients report success.

4. The current grant categories and types are complex which poses challenges for lean staffed districts to compete with larger staffed districts.

Our Recommendations

The data of a grant life cycle should be able to answer the basic question "Does this grant work?" The goal of granting agencies should be to close achievement gap, but the current data does not help with this goal.

Our recommendations are as follows:

1. Administer pre-test scores and post-test scores as a dependent variable. Analyze using either t-test, 1-way ANOVA, and/or repeated measures ANOVA. Regression could be used to predict outcomes given a set of independent variables.

2. Pre-and post-test grant data will help identify past success. While R&D is important, it's value is lost if we do not capitalize on its successes. Therefore, if we only reward new research, we are failing to capture the value of old, and successful, research. Having new data based on pre-and post-tests will allow granting agencies to capture the true value of earlier research investments.

3. Establish a dashboard with pre-test scores. This allows you to measure the end result in comparison to where you were initially. The dashboard could include on-going measures, that allows you to see improvement or proficiency deficiency.

4. Measure amount budgeted/granted vs. budgeted spent. Are you spending all of the money you asked for to make the program work, or are you having a fall back for the following year?

5. Establish a common template of assessment items completed or a count of all items completed in the initial grant proposal, shows a true way to measure an ongoing or completed project instead of the current way of yes.

6. Complex categories and types can be simplified. While there are ostensibly eight agencies/departments, four of them statistically behave the same. Another example is that instead of the 50 states, there are only three categories of states: Small, Medium, and Large, depending on how they interact with their spending. New categorization suggests an opportunity to streamline the management of the grant life cycle.