

How to make effective steps in research and design

Abstract

What is the nexus, or connecting point, between research and design in education? Why should we balance the use of educational programs, interventions, and practices on the research of whether not such tasks are effective? Why not just do things the way “we have always been doing them” instead of pioneering in testing a new method or point of delivery? These are some questions to focus on in the foregoing article. Also, a healthy foundation for research is needed to balance this understanding. Over the last 15 years, I’ve conducted over a dozen large and small-scale research projects, along with ad hoc research,¹ involving as many as several million records and as few as a handful of survey respondents. This has included student assessment results, high school dropout factors, GED school reentry reasons, and plenty of surveys conducted to evaluate programs of various types. In each research project, whether vast or tiny in scale, the same principles have served as guidance. While parts of these lessons learned were refined across the course each of these projects, this article intends to share cumulative insights about research in straightforward way. You, the reader, will learn about how to effectively engage in educational research.

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Jonathan J Doll

Department of Technology Management and Budget, Harvard University, UK

Correspondence: Jonathan J Doll, Department of Technology Management and Budget, Harvard University, Cambridge, UK, Tel 517-200-8564, Email Dollj2@michigan.gov**Received:** November 11, 2017 | **Published:** March 27, 2018

Introduction: effective educational research

Effective research in education is an expected midpoint for the journey of learning. After all, teachers do not just want to be “good” at their craft, but great. To get there, they need to study their data. Also, educational leaders ought not to only have compliant teachers who teach “well” but should foster an environment that continually collects, refines, and examines data in order to find ways to determine which strategies are best in improving student achievement. Paul Graham,² a programming expert and keynote speaker, described research and design for a technologically-infused audience as the distance between what is new and what is good. Aren’t we all technologically-infused as educators so that we can consider his insights? The answer is yes. The business guru, Jim Collins,³ refers to a similar idea in management; he calls it the difference between good and great. But what does this difference actually look like (‘new to good’ or ‘good to great’) when we think about educational programs, interventions, and practices? To answer this question, I believe, requires an integral understanding of research and design.

In the early 2000s, a new kid on the block in education was the idea of Data Driven Decision Making, or D³M (D³M). Paula Wheaton Shorr⁴ of Scholastic, Incorporated, described this as a way for education leaders to open their eyes to see what programs were working, which needed to be tweaked, and how to better manage the process of change. She added that D³M would not make the lives of educators easier, but in fact would be a hard discipline for school leaders to engage in, but with lasting payoffs. In her words, it paved the way for education leaders to “take ownership in the action-research process”.⁴ Kristina Mc Elheran & Erik Brynjolfsson,⁵ in the Harvard Business Review,⁵ added that data use is growing in unprecedented ways because of its usefulness in decision-making. They stated a reason for such growth, sharing that “all organizations can be thought of as information processors that rely on the technologies of hierarchy, specialization, and human perception to collect, disseminate, and act on insights”.⁵ Overall, D³M can be seen as jargon for a method of conducting large-scale research in educational institutions and

businesses, but it cannot be engaged in without first understanding some basic fundamentals of research and design. With that in mind, it’s important to underscore that the process of making strategic decisions using data cannot happen on a recurring basis without becoming astute in how to conduct research.

Why? The simple answer is that many educational data platforms like Schoolzilla (<https://schoolzilla.com>), Power School (<https://www.powerschool.com>), and others, can consistently provide educators with all kinds of data from areas including behavior, attendance, assessments, grades, and so on. However, there will still need to be times where people are surveyed or data is analyzed in new ways rather than just what a data platform delivers. Hence, it is essential to learn more about the research process so that anyone in a school can “own” their data and learn how to find their own insights, lessons, and areas to change. Research and design in education commonly refer to two separate processes that share little in the way of common goals, expectations, and end results. However, when these two distinctly different processes are joined together, there is power waiting to be tapped, collected, and unleashed. To look more deeply at research and design in education, let’s focus on them separately for a moment. Then, we will consider them in relationship together, after that. Effective research is designed to fulfill four basic conditions

1. The urgency for understanding how to improve
2. Hypotheses needing to be tested (and research questions needing to be answered)
3. A balanced understanding of related research (i.e. what has already been learned)
4. Reliable methods and clearly understandable /usable research instruments.

Moreover, effective design processes in education simply mean that programs, practices, and interventions are tailored for learning by all types and levels of students. Also, it should be noted that the

design element in education is not fixed, but allows for adaptations to take place as needed when variables shift or new variables are created. Now, let's talk about these conditions in more detail.

The urgency for understanding how to improve

To begin walking down the road of research, an educator needs to desire to change. After all, improvement does not come by always doing things the way they are being done. Instead, improvement comes by being willing to do whatever it takes to make a program, practice, or intervention successful. And what is success? It is that students are learning and are better able to find opportunities in their future, whether in more challenging current classes, better post-secondary options, and in being better-prepared for work after high school. In all these areas, it takes data to create an undeniable understanding of areas to make improvements. Wellspring Preparatory High School in Grand Rapids, Michigan exemplifies this idea of using data to drive amazing improvements in education. Recently, they created a video that highlights their devotion to best practices.⁶ This open enrollment school has only been open for six years and yet has quickly used solid leadership combined with aggressively high expectations for all students along with a solid focus on data. The result is that they have been able to catapult all types of students to make impressive gains as noted by their #1 ranking statewide according to a U.S. News and World Reports research project.⁷

Hypotheses needing to be tested (and research questions needing to be answered)

Before research (or even the analysis of existing data) occurs, a researcher should make an educated guess at what they hope to find. Sometimes these guesses are wrong, and other times they are accurate, but it is hard to find answers if you are not asking questions. It's difficult at first to make hypotheses about educational data. Here are some examples for illustrative purposes.

Hypothesis 1. "I think that girls are being suspended more than boys."

Hypothesis 2. "I think that our teachers are writing the most referrals during lunch hours."

Hypothesis 3. "I think that male teachers are writing the most referrals."

Hypothesis 4. "I think that math score improvements in middle school exceed other subjects."

Hypothesis 5. "I think that girls are outscoring boys in analytical subjects (math, science)."

Hypothesis 6. "I think that boys are outscoring girls in no analytical subjects (English, social)."

Hypothesis 7. "I think that newer as well as veteran teachers need more training in classroom management."

As you can see, not every hypothesis would be dealt with in the same way. Some hypotheses require data to be collected. Others require existing data to be analyzed more closely. Finally, hypothesis #7 shows an idea about classroom management training that might be difficult to test. In other words, teachers in a school or district might report that they need training or they might not share this. Alternatively, teachers might be writing too many referrals because

school administrators are being inconsistent in discipline and so the problem is deeper than just teachers. In the end, hypothesis #7 shows that there is not only one right way to conduct research but instead many possible avenues.

A balanced understanding of related research (i.e. what has already been learned)

Before conducting any medium-sized or large-scale research project, it is critical to find out what has already been learned. Smaller projects may not have existing research to learn from, but you won't know without looking for it. This means studying what has been published online and in journals and books. A great free resource to help with researching various topics is called Google Scholar, and is available online at <https://scholar.google.com/>.

Finding published forms of research is good for several reasons. First, you might find out about important solutions to problems, such as interventions to use on attendance, ways to reduce referrals, and even free classroom management training materials that could be provided to teachers. Second, research of this kind can help give background information in case you need to write survey questions. You could even find questions that one researcher asked and use them to create an experiment; thus, you could use similar questions in your research project to see if your results were like what the other researcher had found. Lastly, you can use existing research to learn about the history of various areas of education. For instance, you could find out when (and where) public schools started in your state or country. Or you could find out what components are necessary for effective classroom management to occur consistently. Or you could even find a trove of online videos that you could use to provide training for educators after you have conducted your research.

Reliable methods and clearly understandable /usable research instruments

Before you start a research project, it is especially helpful to map it out. Start by drawing a timeline. What would you like participants to do? How long will it take them to do it? How long will it take you to analyze the results? What will you do with the results? And lastly, how will you safeguard the results in case anything in them is private (such as specific responses by participants and so forth)? If you are going to use a survey, it is critical that the survey make sense? There should be a visible order to the questions instead of them being haphazardly arranged. It should sound like a relaxed conversation with someone, which means there is a clear introduction, beginning, middle, and conclusion. When I create surveys, I like to consider the 5Ws (who, what, why, where, and when). In this way, a survey should be directed at specific people (who) and include a welcome section or welcome email. The purpose of the survey (what) should also be made clear in the welcome section/email. Your purpose for having each participant complete the survey should also be made clear (why) as they will be more likely to give useful information when they can understand how it will help them, students, or other educational stakeholders.

The survey needs to be easy to find, like online or printed and disseminated in a commonly used area of your school (where), but not everyone should be expected to complete it in the same way. On countless occasions, some of the participants in my research projects have completed surveys that were turned in by email, mail, and even fax, and then I entered the information online by hand. Remember,

if a participant provides their input in the easiest way for them (i.e. online, or by paper, pen, email, mail, fax, carrier pigeon, and so on), it is your job as the researcher to accept and make full use of their results. Finally, everyone needs to know the final date by which they need to be finished with the survey, which means the due date (when). By taking care of the 5Ws in a survey, and then making sure that the language used flows like a conversation, a researcher is well on the road to engaging in an effective research project.

Balanced design

Before talking about how to design research projects, it is important to focus on how educational programs are designed. In a single word, educational programs are created to achieve a single goal: that of serving the school's customers, which are students. To have a balanced design of an educational program so that it serves students' needs and utilizes available resources in the school, there are three necessary components.

Effective educational programs should have a:

1. Focus on the strengths of participants,
2. Focus on the efficacy of delivery (differentiation),
3. Focus on understanding of results (gender + ethnicity + special populations).

So, what does this look like in schools and districts?

Focus on the strengths of participants

If a program is aimed at students, it should really focus on their strengths. Thus, educators should know the strengths of students, which include learning styles, types of activities enjoyed most, and what the data says are the most effective teaching methods with each class. It takes time to amass these types of information. Strengths of teachers and other staff in schools can be found through purchased programs like Strengths Based Leadership, which was produced by the Gallup Corporation⁸ through the work of Tom Rath & Barry Conchie.⁹ Alternatively, the VIA Institute on Character¹⁰ has made a free strengths assessment tool that analyzes a person's areas of giftedness in terms of a list of twenty-four character-quality strengths. The VIA survey can be found online at <http://www.viacharacter.org/www/Character-Strengths-Survey>.¹⁰

Moreover, schools can also give either of the two above surveys to high school level students. For younger students, Gallup Organization⁸ has made a tool with more age-appropriate questions called the Strengths Explorer. The Gallup Organization's⁸ youth-tool is for students aged 11-14, and is available online at: <https://www.strengths-explorer.com>.

Focus on the efficacy of delivery (differentiation)

Every experienced teacher and leader knows that what worked for one group of students or adults will not as-a-rule work with a different group. The proof of this lesson often comes to young teachers when they have a lesson that works wonderfully with one class and seems like it was the worst lesson with another class. But there is hope in a single word: differentiation.

According the education-writer, Carol Ann Tomlinson,¹¹ the basic meaning of differentiation in education is as follows: "Differentiation

means tailoring instruction to meet individual needs. Whether teachers differentiate content, process, products, or the learning environment, the use of ongoing assessment and flexible grouping makes this a successful approach to instruction." Thus, as teachers differentiate their lessons, more students are able to learn. In fact, the learning styles and strengths of students provide guidance and structure to how the teacher interacts with each class.

Focus on understanding of results (gender + ethnicity + special populations)

After a teacher has taught the same lesson to several different groups of students, it is time to focus on the data. Who learned the lesson? Who learned all the parts of the lesson? Who only learned the first part? The last part?

As educators and education leaders start getting comfortable with looking at data to understand how to make improvements, they are ready to extend their learning. I have found that a key difference between educational institutions that make dramatic programs and those that stay still is which ones have leaders and teachers who create and maintain a deep understanding of data. With that in mind, consider a second time the questions listed above: Who learned the lesson? Who learned all the parts of the lesson? Who only learned the first part? The last part?

If you dig through, or "mine," your data and sort it by gender, you can learn in which classes girls did better than boys, or in which classes boys did better than girls. Then, in schools where there are diverse groups of students, you can extend this by the student's ethnicity or special population (including status as a Student with Disability, an English Learner, or coming from a family that is Economically Disadvantaged). You could even look at other groups, like students enrolled in sports, students enrolled in AP classes, students enrolled in other subjects, and so on. Finally, if you have enough students, you can start to combine these groups so you could learn insights like the following, "Male students in fifth hour math classes who play sports scored 15% less on the math test."

Here is an example that a district shared with me that resulted from being coached in effective data analysis. After deeply studying their data, they found that female students in high school social studies classes did worse on state assessments than male students by a significant percentage. Then, the astute superintendent learned of this and looked at the rosters. Sure enough, social studies classes were being taught by male teachers who also taught physical education classes at the school. In other words, these male, sports-focused teachers were not making enough connections with female students. Because of this tiny yet powerful insight, the school provided professional development to its male teachers and then the female student scores naturally went up.

Now that we have talked about designing programs, we need to return to the topic of designing research projects. The corollary to designing effective educational programs is that designing research is a similar. In other words, research designs should focus on the strengths of the people who participate, which means that surveys should be written in ways that extend what teachers (or other participants) already know. Research should also be differentiated so that every type of participant can take part. This usually means that survey material is written in general-enough language that everyone

can understand, but this can also refer to having multiple delivery types (online, paper, pen, email, mail, fax, and so on) as previously discussed.

A balanced design of research projects enables three goals to be accomplished.

Balanced research is able to:

- a. Help teach the concept being researched.
- b. Help test the theory being questioned.
- c. Help train future work.

In simplest terms, research can help teach a concept by clearly describing it. For instance, a research project on school completion can ask questions about different types of dropout causes including push and pull factors that work to remove students from schools. Push factors are consequences that from rule violations in schools while pull factors are things outside schools that lure students or prevent them from staying.¹² By clearly describing the topic being researched, research participants will be more likely to provide helpful answers. They will also feel like the research project is comprehensive enough to make a difference, which is a common goal that educators share. In all, these efforts will help focus future efforts by provided a clear view of the current state of the topic being researched.

Risks in educational research

In addition to accomplishing the three goals listed above, effective educational research needs to follow a set pattern that includes a timeline and a risk analysis. You might be thinking that educational research does not really have many risks associated with it, yet it does. There are many types of risks in educational research, and large research projects often are required to provide lengthy reasons to justify why the research is important and outweighs these risks. Anyone conducting a medium sized and large-scale research project should study the various types of research risks from a university in their area. The Irvine Campus of the University of California has an Office of Research¹³ that comprehensively described the risks and benefits of in detail. Such risks for larger projects include a wide range of types of harm varying from physical to emotional, psychological, and institutional. For smaller projects, the risks identified by a researcher need to be evaluated one-by-one and a justification made to whomever is approving the research plan.

With that in mind, most researchers will only be working with smaller risks such as a survey taking too much time away from teaching (Research tip #1: Make surveys as short as possible but still learn what it needed for improvements to be made) or asking about personal issues that are important such as bullying (Research tip#2: Always obtain parent permission for student surveys and keep results locked up). It is very important, then, to list the risks of your research project and explain how you will take care of each risk so your participants and your school are protected from harm. Here are two common risks of small and medium-sized research projects and a description of what would cause each type of risk:

Destructive lessons

This occurs when the research project of an educational program is not effectively worded/constructed/tested so that conclusions are unclear or misleading. The risk would be that decisions could be made

to continue, or adapt, or to cease the program being researched that were not correctly being learned.

Deflated buy-in

This occurs when the research project includes long surveys and people tire of participating in research. The risk is that the participants either give faulty responses/information or have less interest in the tasks being researched.

To mitigate these two common risks, a researcher should aim to make the surveying method as logical and appealing as possible to those who participate in the research. These methods could include the following types: Face-to-face interviews conducted during agreeable time periods or non-face-to-face surveys that are short enough for people to complete it in a reasonable amount of time. Having a research project that obtains valuable results also requires that the research goals are clearly shared with participants in a way that answers all the questions they might have or provides a 'frequently-asked-questions' document if necessary. Also, the estimated investment that is being asked for (i.e. the time commitment) should be told to participants in advance so they can decide to participate. As stated previously, surveys/interviews should also not be too long. For guidance on this, here are some examples. A thesis/dissertation survey might have a few dozen questions, but most paper/pencil/online surveys should be 10-15 questions as a maximum. Also, interviews should not be longer than 15 minutes unless the topic or participants agree with the need for a longer period of discussion. Researchers should be sure to remember this lesson: if people tire of taking a survey, they simply give "fake" answers to get out of the survey. Therefore, researchers should remember to keep the length of the survey or interview as short as possible.

Research & development (by extension)

Now that you are getting your feet wet in the research process, you might be nominated to become the leader of current and future research in your school. If that happens, you can put together a "request form" for research plans for anyone in your school which would be evaluated by you, the school/district leader, or a committee. What follows are some sample components of an effective Research and Development (R&D) Plan that can be used for all of an educational institution's research projects (See Appendix for [Sample R&D Plan](#)).

1. Describe the purpose of the research in 30 words or less.
2. What do you want to learn?
3. What are your research question(s)?
4. Do you have any hypotheses or educated guesses about this topic to test?
5. How long will the project take from start to finish?
6. Who will participate? Who is needed to help conduct the research?
7. How will the research be conducted?
8. What is the time commitment needed by participants? By the researcher(s)?
9. What permission(s) are needed, if any?
10. What will you do with the results?

11. When will your interim and final reports be completed?
12. What will you do with the data to make sure it is always safeguarded?
13. What types of recommendations could come from this research?
14. What risks is there (list all)?
15. How will you deal with every risk so that education improves and our school/district mission is also accomplished?

Constructing research

As previously stated, it is important to create an initial timeline for a research project. It is also helpful to sketch out what you would like to learn, what the most helpful lessons could be, and what, if any, misunderstandings could occur while you are trying to learn about a designated topic. As such, it may take several drafts and revisions to write the questions for a survey. It is always good to ask an outside participant what they think of your survey questions, including your welcome section or welcome email.

As a researcher, you should not – under any circumstances – ask a future participant what they think of a draft version of your survey. The reason is that you would “taint” or pollute their potential responses by showing them a draft version. The risk being described here is that if a person sees a survey draft before taking a survey, they might give incomplete or even misleading answers because they may have thought about the topic at multiple times when they interacted with you. That is why it is good to use school and district leaders who will not be participating in the research to proofread and give feedback on your draft questions while you are finalizing the survey. As a researcher, your completed survey, or “instrument” as it is called is your first product. Later, the results of your research will be your second product.

After you have completed the creation of a survey, it may be helpful to imagine that you have a small number of finished surveys. In other words, print five surveys and fill out some sample answers. Then look these answers over and ask yourself how you would analyze the responses. Sometimes, it is not until you are look at the results (even sample results) that you can correctly think about how you will later analyzing the data after surveys are completed.

Conducting research

As stated previously, you want to be crystal clear about the commitment required by participants. Then you want to be overflowing with gratitude for everyone’s participation. This can take place through ‘thank you’ emails, a ‘thank you’ recognition in a staff meeting, and by frequently making warm, friendly connections with everyone who is connected to the research. As a general thought, you should have a “deadline” for when people need to complete the survey. I have also found through dozens of short surveys that there is not a need to forcibly close a survey link after a due date. In other words, you might have one or two people who provide answers a day or so after the deadline, and it is perfectly fine to include such responses in your analyses. Thus, you should examine whatever data you are given (all of it) and not make a practice of excluding any data unless it was faulty for some reason.

Analyzing research

Once all your responses have come in, you need to check them over thoroughly.

In a smaller research project, you might know all of the participants. If you spot some skipped answers, you could use your best judgement to ask if someone wanted to complete a missing question. For example, sometimes participants forget to do the second page of a multiple page survey – and in this case, you would ask them to complete that page if possible.

As you begin analyzing text responses, you will start to hear the thoughts that people were thinking as they took the survey. You might notice emotion(s) in responses or places where you think a misunderstanding occurred (i.e. a person did not understand the wording of a question and you could tell by their response). You may also see clear trends from the survey results. These are some types of insights. For questions with text responses, you might benefit by printing all the responses and then putting them in categories. For instance, to a question about what types of afternoon clubs would teachers like to host, you might learn that 25% are in a category of arts/crafts, 40% are sports/intramurals, and the remainder, 35%, are “other student interests.” In this way, categorization of survey responses greatly helps in terms of being able to understand what people said at a glance. It also makes the survey results easier to present to a larger audience of school leaders or to the whole school.

Many of your numeric/non-text questions can be analyzed in descriptive form. For example, you might find that 25% of teachers were happy with 9th grade classroom participation, 35% were very happy, 40% were unhappy, and no teachers were very unhappy. Providing a descriptive analysis just means being able to describe in sentence or bulleted form what participants reported through numeric/non-text questions. Often, school and district leaders want a short summary or PowerPoint presentation of the main findings of a research project. I have found that it is helpful to create a quick data summary of all the numeric/non-text questions and make this into a short report, or white paper, to share with school or district leaders. This can give them information to help them provide you with some early feedback while you are completing your analysis.

Using for the greater good

Presenting the results of research is an art and skill. You might have learned powerful lessons, but the fact that there are so many lessons means you need to organize (and prioritize) them before sharing with others. Or you might have learned an uncomfortable truth, such as that no teacher expressed a willingness to go above and beyond the call of duty to help students with special needs. Conveying a potentially uncomfortable lesson is best done with school/district leadership in a safe setting rather than just sharing this message with the whole school. The researcher must remember that they are responsible for the results whether those results are ‘positive’ or ‘negative.’ Therefore, by being a good steward of educational data, a hardworking researcher might start thinking of some positive recommendations that could help with any potentially uncomfortable lessons learned in research. Remember that it is not really that valuable or helpful when people act as naysayers and complainers in an educational institution. Oftentimes, these behaviors are shown by people going about the task of making negative comments about an educational program, practice, or intervention. However, when someone “owns” a problem (that was learned through research) and intentionally creates a solution, then research has made its positive mark! Hurrah for that!

Presenting and publishing research

After you conduct an effective research project that used a balanced design process and you learned something that was

important in your school or district, it is time to share your insights. To do this, you would create a detailed PowerPoint that describes your whole research project, who participated, the lessons learned, and any helpful recommendations that could be deduced from the results.

To start with, you could share this with the school and district leaders, and then with your school. Here are some other venues to consider:

- i. A regional education meeting including your district leaders or those of other districts
- ii. A local symposium
- iii. A parent-teacher association
- iv. A special education advocacy group
- v. A local or regional college class or a small conference
- vi. A regional conference or meeting of educators and education leaders
- vii. A national meeting
- viii. And so on.

AppendixA

Sample research and development plan (for proposing research projects)

Title of Research Project:	
Way(s) that the Research Project will fulfill and align with the school/district mission:	
Specific value addressed and supported by the Research Project, and why:	
Purpose of the Research Project (30 words or less):	
Name(s) of the Researcher(s):	
<i>Individual Questions to the Researcher(s):</i>	
1) What do you want to learn?	
2) What are your research question(s)?	
3) Do you have any hypotheses or educated guesses about this topic to test?	
4) How long will the project take from start to finish?	
5) Who will participate? Who is needed to help conduct the research?	
6) How will the research be conducted?	
7) What is the time commitment needed by participants? By the researcher(s)?	
8) What permission(s) are needed, if any?	
9) What will you do with the results? (i.e. how will they be reported on, shared, etc.)	
10) When will your interim and final reports be completed?	
11) What will you do with the data to make sure it is always safeguarded?	
12) What types of recommendations could come from this research?	
13) What risks are there (list all of them)?	
14) How will you deal with every risk so that education improves and our school/district mission is also accomplished?	

Being in a place where you share the ideas learned in research puts you in a place to extend your learning. Sometimes one of the most powerful insights from your research will come from a sidebar conversation with a participant at a conference or from someone who attends your presentation and gives some objective (and oftentimes constructive) feedback. The lessons that can be learned from presenting the results of a research project are virtually endless.

Conclusion

It is my hope that this short volume on how to conduct an effective and balanced research project can be of help to anyone that wants to infuse their institution's decision-making processes with data that could be valuable. Nowadays, data is everywhere and the difference between schools with results and those that are standing still often comes down to the understanding and application of educational data. If this article has been helpful to you, pass it on. You just might find a research partner by sharing this article. Or you might encourage someone else on a project that can transform education in ways not yet imagined. Similar to what I said before, the potential benefits of well-crafted, well-conducted research is that it holds the power to change a current reality into a desired one. And who could want something better than that?

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Conflict of interest

None.

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