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A Behind-the-Scenes Guide to School-Based Research

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Abstract

Schools are an important context for both basic and applied scientific research. Unlike the laboratory, however, the physical and social conditions of schools are not under the exclusive control of scientists. In this article, we liken collecting data in schools to putting on a theatrical production. We begin by describing the large cast of characters whose collaborative efforts make school-based research possible. Next, we address the critics, including the university Institutional Review Board (IRB) and school administrators, whose feedback often improves the final study

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design. We then turn our attention to set building, stage directions, and rehearsals – key steps in the iterative process of refining study procedures. We end with a discussion of the day of data collection itself and activities that take place after the curtain drops. Throughout, we make recommendations based on our recent experience collecting data at several high schools.

All the world's a stage

~William Shakespeare, *As You Like It*, 2.7.139

Most researchers collect their data in laboratories. By definition, laboratories are physical spaces whose features can be carefully controlled. Schools, in contrast, are not institutions whose primary purpose is to provide a carefully controlled setting for scientific experimentation or observation. Nevertheless, the importance of schools as a context for scientific research cannot be overstated. Most obviously, translational research at the intersection of educational practice and basic science depends on in vivo data collection from students and teachers.

Motivations for conducting school-based research are diverse. For instance, scientists interested in youth between the ages of 5 and 18 understand that their subjects are too young or too busy to travel to laboratories on their own. Some researchers are particularly interested in representative samples and, thus, eager to expand their recruitment beyond the upper middle class families who are most commonly involved in lab studies. Given the importance of developmental research in this age range and, in particular, the potential for translational research to inform both basic science and educational practice (Donovan, 2013; Brabeck, 2008), what can be done?

Recently, several researchers have shared observations from their own school-based studies. For instance, Alibali and Nathan (2010) provide an overview of the research cycle, beginning with approvals from school district officials and concluding with how to show appreciation to the school community after data collection is completed. More recently, Glennon and colleagues (2013) describe a successful lab school partnership, a tradition advocated by Dewey (1899) entailing a deep, long-term commitment between researchers and educational practitioners. Their insights are particularly helpful in understandings collaborations in which the topics for research are decided upon in equal partnership.

Recently, the last author of this article joined a small group of psychologists to discuss how to increase the quality and quantity of school-based research (Radcliffe Workshop, 2013). A major constraint, the group agreed, was simply lack of procedural knowledge. Indeed, all of the group members had learned what to do (and, just as important, what *not* to do) from a relatively inefficient process of trial and error. None of them felt that their graduate training had adequately prepared them for the unique challenges of conducting research in schools. Like most human endeavors, learning from mistakes is inevitable. Still, the consensus among those present at the workshop was that a field guide to school-based research could be helpful.

In the current article, we liken school-based research to putting on a play. See Figure 1. Drawing from our recent experience conducting a multi-site study of cognitive skills and

personality traits in high school seniors, we begin by describing the large cast of characters whose separate contributions are essential to a successful performance. Next, we consider the critics, most notably the university Institutional Review Board (IRB) and school administrators. Once their scrutiny has been satisfied, researchers can proceed with the iterative process of rehearsing and refining procedures in preparation for the day of the show: collecting data. Finally, we discuss post-show activities including managing data and debriefing all stakeholders in the research process, including students, parents, teachers, and administrators. We conclude that the considerable challenges inherent in school-based research are surmountable with careful planning, clear communication, and a readiness to continuously iterate, learn, and improve.

Cast of Characters

Our core research team included a principal investigator, post-doctoral fellow, research coordinator, and school liaison. As with conventional laboratory research, the principal investigator took final responsibility for all aspects of the research program, meeting weekly with the full research team to review milestones and troubleshoot as necessary. Specific to the school-based design of our study, the principal investigator also strove to meet periodically with school administrators, faculty, and parents to communicate the overall goals of the research as well as to update them on progress and problems. In our study, the post-doctoral fellow was responsible for day-to-day leadership of all study activities, responsibilities for which he particularly suited for given his prior experience as a classroom teacher and, while earning his doctorate in psychology, studying self-control in school-age children. Our research coordinator, a recent college graduate with more computer experience than anyone else on our team, took primary responsibility for setting up and troubleshooting the technology-related components of our research, which, given our plan to collect data exclusively online from students and teachers using school computers, were extensive. Finally, our school liaison was a retired 37-year veteran school teacher and administrator who managed communication with students, parents, teachers, and administrators. We recruited additional personnel as needed for the day of the show, but the above mentioned core team was responsible for day to day operations.

Our study of cognitive and non-cognitive traits included over 2,000 students from 5 high schools spanning 4 different public school districts. During preliminary meetings with school district administrators (e.g., superintendents and principals), we asked that a primary contact be designated to coordinate all aspects of the project. For most schools, this contact was an assistant principal or grade-level dean, whose respect and familiarity among teachers, students, and parents proved essential to successfully advocating for our research project. Critical to the success of the study, our primary contacts were especially conscientious and energetic, attending to innumerable details of the study including communicating with parents and teachers, distributing consent forms, scheduling data collection sessions, troubleshooting problems on the day of data collection, and coordinating the transfer of school records. Our research funding made it possible to offer an honorarium to each primary contact in recognition of the many hours they devoted to the project. Crucially, at all sites, our school contacts were reachable by cell phone during the entire data collection session and reachable via email virtually any time during the days leading up to

data collection. Their accessibility proved crucial when we faced unexpected events both before and during data collection. Obstacles which threatened the success of the study were, on several occasions, surmounted with the quick and responsive assistance of the primary school contact.

Because our study design included several computer-based tasks, we also worked closely with the technology director at each of our partner schools. The technology director and her team ensured that the necessary infrastructure (e.g., Internet connectivity) was in place and, in addition, worked with our team to pilot and troubleshoot administration issues (e.g., firewalls). Finally, classroom teachers supported our project by being present and maintaining discipline during data collection sessions, correcting roster errors, and arranging student seating. In addition, a subset of these teachers completed online informant-report questionnaires rating students on a range of behaviors relevant to our research project. While the majority of teachers responded within two weeks, some teachers with higher class loads took much longer. Via our primary school contact, we thanked teachers for their time with small gifts (e.g., chocolates, their choice of gift card). In future studies, however, we plan to follow the recommendations of Groves, Cialdini, and Couper (1992) and provide these gifts before rather than after survey completion.

By meeting in person frequently, maintaining candid and transparent communication (both when things were going well and when, inevitably, obstacles were encountered), castmates on both the researcher and school practitioner sides developed positive relationships characterized by trust and respect. Considering prior research projects that were decidedly less successful in their execution, we have concluded that these relationships are essential and their importance cannot be overestimated. Indeed, we realize in hindsight that we could have done more to communicate the study goals and procedures to teachers prior to the day of data collection. In future work, we aim to give a short presentation at a faculty meeting at the start of the research collaboration and again after data have been collected and analyzed. Such interactions provide teachers a crucial opportunity to ask questions, raise concerns, make suggestions, and otherwise engage actively in the research process.

The Critics

Every production has its critics. First and foremost, our study procedures were scrutinized by our university's Institutional Review Board (IRB), a committee tasked with overseeing and approving all protocols for human research. A complete IRB protocol includes a brief background section; detailed descriptions of all measures, data collection procedures, data management and confidentiality practices; a signed letter of support from each school partner; and verbatim copies of parent consent and child assent forms. Each time the protocol is substantively changed, an amendment must be submitted. In our experience, the review process can extend to weeks and even months depending on changes requested by the IRB (e.g., to improve data confidentiality practices) as well as modifications proposed by the research team (e.g., changes in measures as a result of piloting).

Since requiring signed consent forms from parents can result in a biased sample of participants (Anderman, 1995), we emphasized in our IRB protocol that procedures posed

minimal risks to participants and therefore justified implied parent consent procedures. This enabled us to send letters home to parents (initially drafted by the research team and then edited by our primary school contact) describing the planned research. In these letters, parents were told that not returning the letter or otherwise contacting the school or our research team implied their consent for their children to participate. In retrospect, we realize that we should have asked schools to use their automated phone message system to alert parents about the mailing, thus providing two rather than one occasion on which parents were notified. We intend to do so in future studies.

In addition to parent consent, our IRB deemed the high school seniors involved in our research as old enough to understand the procedures and make an independent judgment as to whether they wanted to participate. Thus, on the first day of data collection, we provided students with information about the study and offered them the opportunity to either participate or, alternatively, to complete a non-research activity during data collection sessions. For example, students who declined participation could read their own books quietly or go to the library to do homework. Following these procedures, participation in our project exceeded 90% of eligible students, and there was no evidence of selection bias on demographic variables including gender, ethnicity, and free/reduced-price lunch status.

School administrators comprise a second set of critics whose feedback is critical. For instance, our primary contact reviewed all study measures and procedures in advance, ensuring that questions were both comprehensible and non-sensitive (e.g., no questions about drug and alcohol use). Our primary contact for each school made every effort to schedule data collection sessions during non-academic periods (e.g., study hall or advisory periods) and on dates that did not conflict with important school events (e.g., assemblies, standardized testing). Because scheduling constraints varied widely by school, we had to be flexible, particularly in the duration and number of data collection sessions. For instance, in one school, we collected data in four separate sessions, each lasting about 50 minutes. In another school, we collected data in one extended session lasting more than an hour and two shorter sessions lasting about 30 minutes each. Similarly, at different schools, we collected data in different locations, including classrooms, the school library, the school computer lab, and the cafeteria. One common feature of all our school sites was the necessity of at least one make-up session, planned in advance, for students who were absent on their originally scheduled date.

Building the Set and Writing the Script

A performance is only as good as the preparation that precedes it. Accordingly, prior to collecting data in schools, a tremendous amount of time and effort must be devoted to the study design (set building), the procedures that are followed on the day of data collection (scripting), and rehearsing, over and over again, each time making improvements. A codebook, which we updated throughout the study, included documentation of final study materials and procedures, as well as the specific dates that parent consent forms were distributed, testing dates including which measures were administered and to whom, a full copy of the IRB protocol, and syntax for questionnaire scoring and data analysis.

Our study involved questionnaires and tasks which, ultimately, we decided to administer via websites accessed by school computers. Like any decision, there were trade-offs to consider. On the one hand, online administration meant managing computer lab firewalls, equipment failures, Internet connectivity problems, and related technology issues. On the other hand, collecting data online obviated the need to transport and store questionnaires, thereby reducing cost, hassle, and the possibility of a breach of confidentiality. Likewise, we had to make difficult choices between longer, more accurate measures and shorter, less precise ones. At each school, we made the decision between erecting cardboard dividers, which kept students on-task and enhanced their sense of privacy, and forgoing those benefits in order to reduce set-up time and maximize desk space.

To ensure that data were collected in the same way across classrooms and schools, we wrote a script for research team members to follow closely on the day of data collection. This script included both what to say aloud to students (dialogue), where to stand, and when to pause, etc. (stage directions). The script also contained a reference section with all study website URLs as well as wireless network information and an administrator logon for the school computers. Finally, a troubleshooting section included solutions for common technology problems, cell phone numbers for the primary contact and other research team members, and responses to frequently asked questions. We provided teachers who were present in the classroom during data collection sessions with their own script. Namely, at the earliest opportunity, we introduced ourselves to the classroom teacher and asked for their help in maintaining classroom discipline.

Rehearsals, Rehearsals, Rehearsals

No matter how good the script, the cast must rehearse frequently. For us, piloting was an iterative process carried out over several months. These rehearsals, though time and effort intensive, enabled us to improve the script dramatically. Usability studies in engineering suggest that a surprisingly small number of participants can efficiently identify problems during piloting (Daniel, 2012). Accordingly, we typically asked between five and seven individuals to pilot measures before using their feedback to make improvements. Whenever changes were necessary, we conducted additional pilots to ensure that our solutions did not precipitate further problems.

Initially, we piloted measures in our lab to identify technological glitches, spelling and grammar errors, and similar “obvious” problems. In addition to lab members directly involved in this project, we included other willing volunteers (e.g., graduate students working on other projects). Naïve pilot subjects proved an especially critical and, therefore, especially helpful audience. Their many suggestions vastly improved the clarity of directions and the overall task flow (e.g., transitions between questionnaires). To identify potential problems associated with multiple users accessing our server at once, we then ran an online pilot with several hundred adults recruited from Amazon.com’s Mechanical Turk marketplace. Finally, we conducted pilots with high school juniors who, though they attended our partner schools, were not seniors and therefore ineligible for study participation. During these “full dress rehearsals,” we followed scripts for administering measures exactly as we would during actual data collection, using both the data collected

and verbal feedback (e.g., regarding unclear directions or unfamiliar terminology) to make final improvements.

Both piloting and detailed discussions with our school contact enabled us to foresee possible problems with task administration and to develop contingency plans accordingly. For example, occasional disruptions of Internet connectivity during piloting prompted us to bring hard-copy versions of online questionnaires on the day of data collection which, at one of our partner schools, we ended up using. Similarly, the variety and novelty of problems encountered led us to add an extra researcher to our team. In one school, this “extra” researcher helped move laptops when, without warning, we were asked to move from classroom to another. At another school, this individual helped relay messages (e.g., information about schedule changes) from one classroom to another.

Day of the Show

Even with adequate preparation, show time can be hectic. We have learned the hard way that while members of the cast (researchers and school practitioners) may rehearse their routines to fluency, members of the audience (students themselves) most certainly do not. For instance, even though teachers at every school site in our study announced to students exactly where they were to show up on the day of data collection, at least a few students at each school reported to the wrong classroom and had to be redirected to their assigned location. Once seated, it was typical for one or two students in the classroom to forget their computer login or password, thus requiring a researcher to use an administrator password to grant them access. On average, we found that it took up to fifteen minutes for all students to arrive to their assigned classroom, take a seat, put away their cell phones and books, settle down, and log in to their computers.

Once students were settled and on task, maintaining a controlled environment was paramount. We found the best way to do so was to circle the classroom frequently, passing by students slowly but, to maximize their sense of privacy, deliberately maintaining a disinterested demeanor and directing our gaze away from their screens. When not pacing about the room, we liked to stand where we could scan the entire room for raised hands or disruptive behavior. If a student was talking or otherwise off-task, we gently reminded them to turn their attention to the study activities. In rare instances of serious misbehavior, we asked the classroom teacher to intervene. Notwithstanding these precautions, we kept meticulous notes about administration, foreseeing correctly that some data would be excluded because of technological problems or student misbehavior.

Another lesson learned was to expect the unexpected. In our study, we were surprised by fire alarms, field trips, and all-school assemblies, among other events which, in most cases, had been arranged by school administrators other than our primary contact. On one occasion, we were forced to reschedule the entire data collection session when, on the originally scheduled morning, we awoke to discover that schools were closed for severe weather. In another school, entire classes of students showed up late (or not at all) to their assigned classrooms for reasons we never figured out. In all of these cases, the study was rescued by

our ability to reach our school contact by cell phone and to make alternative plans accordingly.

After the Curtain Comes Down: Following Through with Cast and Audience

Unlike a dramatic production, much of the work of a research study goes on after the curtain comes down. Data collection sessions spanned several days at each of our school sites, and at the end of each day, we met with our primary school contact to discuss attendance and behavioral problems, unexpected events, technological glitches, and anything else that prompted changes in procedures for the next day. We also examined our data, scrutinizing files for missing or impossible values and completing preliminary analyses to ensure that data had been collected properly. In tandem, we updated our list of opt-outs with the names of students whose parents had provided consent but who themselves elected not to participate in the study. We also consolidated our notes about anomalies during administration (e.g., students starting a survey over at its midpoint, students who came late to test administration, sessions that ended early because of a fire alarm, Internet connectivity problems). All notes were included verbatim in the codebook which, as mentioned before, was a living document that we constantly updated as the study progressed.

In the weeks following data collection, we completed more detailed analyses of the data, following a standard protocol defined by our lab. Among the more mundane post-production activities were the unpacking of supplies (e.g., extra ear buds, cardboard dividers, handouts) and repacking for the next scheduled data collection. During this period, we also followed up with our primary school contact to obtain school records (e.g., report card grades) relevant to our study hypotheses.

While preparing data for analysis and fitting statistical models can take a long time, school faculty, parents, and the students are understandably eager to learn how the research turned out as soon as possible. We therefore distributed a one-page newsletter with at least a few confirmed study findings before the end of the school year, posting an electronic version on our website and making sure each primary contacts sent printed versions to their entire school communities. In future studies, we hope to do even better, preparing longer reports with more substantive information, perhaps supplementing study findings with additional information on topics of special interest to the school community. In addition to newsletters, we made presentations in person to faculty and parents at school sites that were located near our campus. In the future, we intend to film presentations for school partners we cannot visit in person at the conclusion of data collection. As a final gesture of gratitude, we sent thank you notes and candy baskets to each school at the very end of the school year.

Conclusion

Conducting a school-based research study, like performing a play, can be daunting. The challenges associated with collecting data from students in vivo are numerous and qualitatively different, in some ways, than those encountered in standard laboratory research. Our strong belief is that school-based research is nevertheless viable. Success depends in large part on a cast which collectively exemplifies enthusiasm,

conscientiousness, and flexibility. Each member of the cast, both at the research institution and the school site, plays a special and important role. The feedback of critics, in this case the university IRB and school administrators, must be received and incorporated into the study design. Many months before data collection itself, the cast of a school-based research study is hard at work designing the set, writing the script, and making refinements based on pilot work. At long last, there is the much anticipated and often hectic day of data collection itself. Despite dress rehearsals and careful planning, data collection inevitably comes with at least a few surprises, demanding that cast members troubleshoot on the spot and maintain open and clear lines of communication. Finally, after the curtain comes down, there is yet more work to do. In particular, data need to be analyzed, results need to be communicated, and gestures of gratitude need to be made in recognition of the substantial contributions made by all concerned.

The urgent need for more inquiry at the intersection of science and education (Donovan, 2013) motivated us to pen this article. The study of cognitive and non-cognitive traits in high school seniors to which we allude throughout our remarks is, of course, just one example of school-based research. Other studies, using different methods and different samples to answer different research questions, will have their own particular challenges. Still, we hope others can learn from our experience, including things we are proud to have done reasonably well and, in addition, the mistakes we hope other researchers (and ourselves) will avoid in the future.

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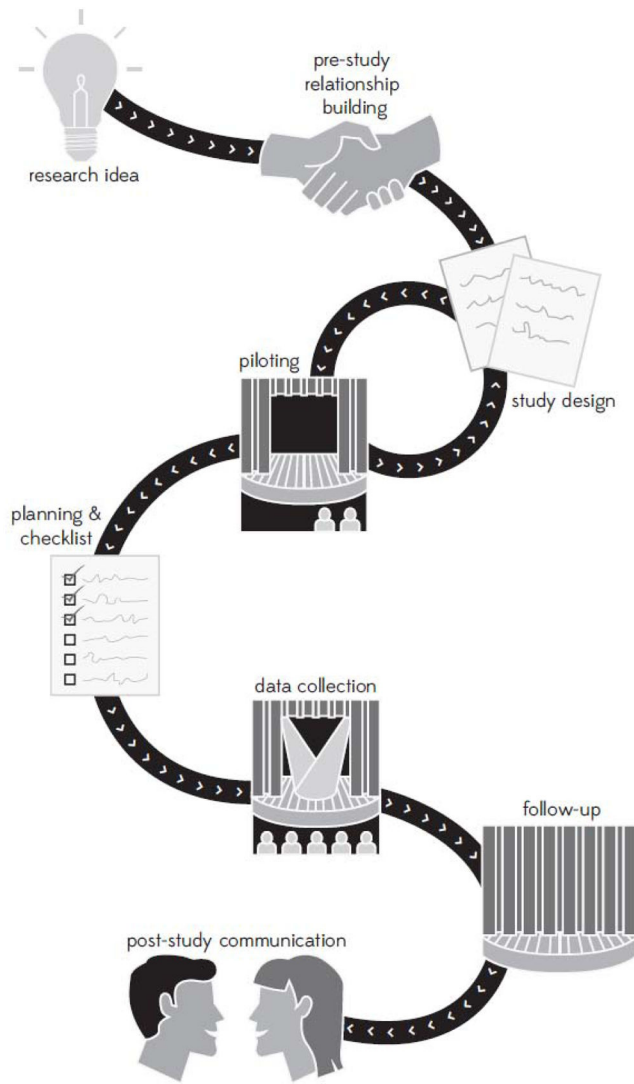


Figure 1. The process by which a research idea becomes a viable school-based research study.