Using Education Research Methods to Identify Key Factors in Successful Student Outcomes in Diverse Learning Environments

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Abstract

Educators in the field are generally ill-equipped to translate evidence-based practices from the peer-reviewed literature into actual classroom and school-wide practices that promote student success (Cook, Landrum, Tankersley, & Kauffman, 2003). Further, many educators are averse to employing evidence-based approaches in their school settings (Whitehurst, 2004; Wolk, 2007). I propose that the lack of guidance in the literature on how to apply evidence-based practices in authentic settings has created a barrier to application and that this places an unrealistic expectation on educators to figure these things out for themselves. As such, educators' aversion to the use of evidence-based practices may be more of a result of resentment at being expected to do something they've never been taught to do. This paper advocates the application of education research methods to the development of lines of inquiry to be pursued in real school settings in order to address barriers to student success, as well as to identify factors that contribute to student achievement, for the purpose of promoting student achievement among all students within a given learning environment. Recommendations for school-site analyses are provided.

Keywords: school, classroom, class, student, teacher, K-12, research, applied, application, assess, evaluate, assessment, evaluation, peer-reviewed, evidence-based

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1 Author Note

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2 Introduction

The pedagogical application of empiricism in the school setting is still a hotly debated topic in public education, even now as we are well into the 21st Century. As some local education agencies (LEAs) embrace evidence-based practices, such as school-wide Positive Behavioral Supports and Interventions (see http://pbis.org), others balk at the very idea of data collection in the school setting (Cook, Landrum, Tankersley, & Kauffman, 2003; M. Goodlaw, personal communication, March 31, 2013; Whitehurst, 2004; Wolk, 2007).

What the research reflects is that teacher education programs generally do not teach or encourage the application of research methods to identifying the needs of individual learners so as to promote their individual academic success, something that becomes even more challenging when student populations are diversely heterogeneous (Cook, et al., 2003; Whitehurst, 2004; Wolk, 2007). This paper seeks to bring basic knowledge to those who need it to help them initiate the process of problem-solving within their campuses by identifying the key factors that need to be measured and examined as part of the problem-solving process. I look herein at the approaches currently used by education researchers to identify variables required for measurement in the pursuit of answers to experimental questions in education research and compare them to the indicators of needs that must be identified in the actual school setting in order to support each student's development and educational growth. Preliminary recommendations for educators follow thereafter to aid them in developing school-based programs that promote academic achievement and positive school participation among student bodies, regardless of how diverse they may be.

Acknowledging the problem is half the battle, but the problem can't be acknowledged until it is first identified and that initial process can be where many educators get stuck, unsure of how to proceed (Cook, et al., 2003). The information and recommended approaches described herein are intended to give educators a framework within which they can operate to address key issues in their school settings that impact student performance. By clearing this initial hurdle of identifying exactly what it is they are trying to tackle, educators can then move beyond the point of initiation and on to the process of analyzing their findings for the betterment of their students, their schools, themselves, and their communities.

3 Literature Review

3.1 Current Education Research Methods

In education research, the problems being tackled are formulated as research questions. Research questions dictate the research type and paradigm that will be used. Qualitative research is that which takes anecdotal information, often in rich detail, from observers, but which contains no measurement data such as test scores, frequency of specific behaviors, time on task, etc. Quantitative research relies on empirical data collection and analysis. Mixed-method research uses both qualitative and quantitative approaches, allowing for empirical data to be considered within their relative contexts. Experimental research questions are not intended to judge the value of some- thing; they are to identify the answers to specific factual questions. Those answers are then used to inform decisions regarding many things, including the value of a program or practice as well as how to improve programming. As such, research questions must capture as many of the aspects of the problem as possible so that their answers provide enough information to be constructive and useful (Fraenkel, Wallen, & Hyun, 2010).

There are four essential characteristics of good research questions: (a) they are feasible, (b) they are clear, (c) they speak to significant concerns, and (d) they are ethical. A feasible research question can be examined with resources that are already available and/or easily obtainable. Clear research questions are framed in plain-enough language that what is being asked is readily under- stood by most people and that key terms are given specific definitions to ensure that everyone reading the research documents understands how those terms are being used and what they specif- ically represent. Research questions do not seek to waste resources on trivial concerns and are meant to help better the human condition; they only pursue things that are worth investigating and they are deliberately constructed so as to avoid causing harm to anyone or anything. They often

investigate relationships between or among different factors of a given situation (Fraenkel, et al., 2010).

Once the research questions have been identified, then the researchers review the existing published literature to identify what has already been measured and analyzed, as well as what remains to be measured and analyzed in relation to the existing body of evidence. The literature review is an important component of education research because (a) it prevents unnecessary redun- dancy and promotes the efficient use of resources by informing researchers of what has already been determined based on the existing evidence, which (b) thereby allows any new education research to build upon and expand our current knowledge and understanding of:

- How humans develop over their lifetimes,
- The bioecological factors of how people at all stages of development learn,
- How best to deliver instruction so that it caters to people's respective natural tendencies towards learning and thereby maximizes each educational opportunity, and
- How to evaluate the efficacy of education programs and make improvements that increase achievement across all subpopulations of our nation's students.

Simply put, well-informed decisions are more likely to pay off than poorly informed decisions. As such, education research seeks to provide the information necessary for educators to make well-informed decisions that will pay off for students, their families, their educators, their communities, and our society as a whole (Fraenkel, et al., 2005).

3.2 Identifying Individual Student Needs

Identifying individual student needs may become necessary in order to address any challenges that are preventing all students in a given learning environment from benefiting from his/her educational experiences. If the goal is to render quality education to all students, then all students must receive the amount of attention to their individual situations necessary in order to ensure they achieve in school. Educators must simply accept as facts that all students are unique individuals and that a mass-production mentality does not serve many of them. Group instruction is an excellent vehicle for fostering collaborative learning experiences, but is not the only viable method of instruction and is not always appropriate for some students. Group instruction is encouraged in most educational settings because it allows for the more efficient use of resources, but sometimes this is at the expense of instructional efficacy (Johnson & Delawsky, 2013).

Identifying individual student needs is not legally required of educators in any context other than special education (*Assistance to States for the Education of Children with Disabilities*, 2004). As such, most general education teachers are at a disadvantage because their teacher training did not include the same kinds of guidance given to special education teachers during their teacher training programs regarding how to individualize instruction according to diverse learner needs. That said, the evidence in both the literature and the field is that individualizing education programs for children in special education is still problematic for special education professionals (Yell, Drasgow, & Robinson, 2001), so to say that general education teachers are disadvantaged relative to special education teachers when it comes to developing individualized approaches to student success is to say that general education teachers are utterly in the dark on how to do this, by and large.

Children who have qualifying conditions and, because of them, require specialized instruction in order to receive meaningful educational benefit are entitled to a free and appropriate public education (FAPE) that includes special education and related services as described by an individualized education program (IEP) (*Assistance to States for the Education of Children with Disabilities*, 2004). While Response to Intervention (RtI) strategies are intended to provide for individualized instruction where needed, far too few schools that claim to use RtI actually adhere to RtI protocols; most fail to build valid and reliable fidelity checking into their RtI programs or collect adequate data (Hill, King, Lemons, & Partanen, 2012; Keller-Margulis, 2012; Vanderhayden, 2011). Further research is necessary to test my hypothesis that RtI is not implemented with fidelity in the field because schools are not legally required to comply with RtI protocols.

In order to speak to the issues of individualization in the public school setting, we are left with the existing examples of where individualization is or has been attempted for guidance as to how individualization is to be accomplished, with the understanding that the failures encountered in individualizing instruction in the public school setting are as informative as the successes that are being achieved. Herein, I speak in terms of the ideal standards of special education and RtI with respect to their individualization in the school setting.

In special education, the identification of unique student needs begins the process, starting with formal assessment by a multi-disciplinary team of qualified assessors. Data is gathered from all available resources to determine the nature of each student's learning challenges and the skills and knowledge that must be imparted through specialized instruction and any related therapeutic services that might be necessary in order for the student to reasonably pursue grade-level expectations. Standardized assessment measures are typically administered and the scores obtained on those measures are used to inform decisions about each special education student's IEP,

including identification of the IEP's present levels of performance. The present levels of performance data is meant to inform the baselines for the goals that will be developed under the IEP.

In special education, the goals are required to be measurable. Further, IEPs are required to be reasonably calculated to render meaningful educational benefit. IEP goals describe the intended outcomes of one year's worth of special education and related services for an individual student. In examining whether an IEP offer from an LEA to a student is reasonably calculated to render meaningful educational benefit, triers of fact generally must examine the IEP goals to determine if the outcomes they pursue are appropriate to the needs of the student for whom they were written. The outcomes pursued by the IEP are a critical part of what makes an IEP a legitimate offer of FAPE or not. The goals must represent meaningful progress above the student's performance at baseline. The measurability of the goals speaks to the degree to which they are reasonably calculated to render meaningful educational benefit, a legal requirement of a FAPE that appears to mandate the use of empiricism. One cannot calculate degrees of educational benefit without calculable baselines and performance data over the course of each goal's implementation. Whether benefit is meaningful or not depends on the amount of progress demonstrated relative to the outcome targeted by the goal, which is based on the student's capacity to learn as identified by assessment (*Assistance to States for the Education of Children with Disabilities*, 2004; *N.B. vs. Hellgate Elementary School District*, 2007; *Board of Education of Hendrick Hudson School District vs. Rowley,* 1982).

In RtI, short-term goals are developed based on pre- and post-intervention data and continually revised as students progress through the curricula, with mastery of grade-level standards by the end of the school year being the long-term desired outcome. Baseline data is taken to identify where the student is currently performing, instruction according to the methods appropriate to the student's needs as they are understood is attempted, and data is taken on the efficacy of the instruction, which includes the student's performance data. By comparing pre- and post-intervention performance data, teachers determine if the student mastered the necessary concepts and is ready to progress to the next lesson. If the instruction proves successful, then it will continue to the next lesson, which is also followed by an analysis of the data to determine if the program is remaining effective or if any changes to it need to be made. If the instruction proves unsuccessful, then educators collaborate to determine if additional supports or changes in instructional strategy are necessary to make the instructional goal achievable or if the goal is inappropriate and needs to be modified or replaced with a more appropriate goal (Slavin, 2012).

In special education, services and placement are driven by what is necessary to see the goals achieved in the least restrictive environment (LRE) relative to the student's individual needs and is, thus, a critical component of

individualization that acknowledges the importance of environment. The LRE requirements are meant to protect children from being segregated out of the general education population purely on the basis of disability without regard for whether removing them from general education is appropriate to their educational needs. Most special education students are served under their IEPs in the general education setting for most of each school day (*Assistance to States for the Education of Children with Disabilities*, 2004; National Center for Education Statistics, 2012).

RtI is delivered in the general education setting, though some schools have set up "learning centers" that double as pseudo-RtI programs blended with resource specialist program (RSP) services rendered by credentialed special education teachers. These "learning centers" are intended to support low-performing students who have not been identified for special education as well as those who only require relatively low levels of special education intervention in academics, such as students with specific learning disabilities. On the surface, the scenario makes intuitive sense. However, in practice, it can become a mechanism by which school districts avoid identifying students who require special education by hiding them in a "learning center" setting among other students who are struggling to meet grade-level standards and thereby avoid the accountability that would otherwise be attached to these students were they to be served under IEPs. It isn't that true RtI is not achievable in the field, but delivering it as designed requires a greater degree of scientific rigor on the part of school staff than most have been trained to understand or apply (Cook, et al., 2003).

Where individualization is discussed herein with respect to recommendations, it is with the presumption that there is sufficient compliance and competence on the part of staff to deliver an appropriately individualized plan such that its goals are met. For LEAs and individual school sites that lack staff members who already possess the skills to individualize student programming as needed to promote success in all students, highly specific in-service trainings for current and new staff on the necessary skills are recommended. For settings with internal cultures that do not promote individual student success, it may be necessary for these LEAs or school sites to bring in outside consultants to determine why their cultures are placing higher priority on things other than student success, such as in schools in unsafe neighborhoods, and address the negative factors that are poisoning the health of the LEAs' or individual schools' respective cultures, through policy changes, staff training, and/or staffing changes. It is improper to blame staff for problems brought to their doorsteps by other factors that impede student success, but it is entirely reasonable to expect staff to have the skills, knowledge, ability, and willingness necessary to contend with

whatever factors that present themselves in their learning environments that threaten their students' academic achievement and healthy development.

3.3 Ecological Considerations

Children do not exist in vacuums; they are part of the richly woven tapestry of the human experience. Whether students are considered individually or in groups, the environments in which students regularly function impact them in myriad ways. Social learning theorist Urie Bronfenbrenner described the impact of environment on developing children in his bioecological model of child development. Bronfenbrenner made the observation that humankind is the only known species that alters its environments in ways that alter the development of its individual members; we alter our environments in ways that allow us to express choices, adapt to the altered environments, alter per our choices again, adapt again, and so forth and so on in perpetuity. As such, it is within our power to choose to create environments that promote optimal development and, if we regard ourselves as civilized in any way whatsoever, we should. Bronfenbrenner himself asserted as much (Wertsch, 2005).

In developing research questions that speak to the issues that are impacting student achievement in the school setting, looking at environments is critical. Further, the examination should not be limited to the school setting. For students who are living in tenuous situations outside of school, whether due to homelessness, domestic violence at home, gang involvement, the serious illness or death of a parent, or any number of traumatic and distressing situations that can unfortunately happen to children, ecological factors outside of school can play a significant role in how well students function at school and cannot be ignored when developing research questions that address student success (Clark & Dorris, 2007; Gillen-O'Neel, Ruble, & Fuligni, 2011; Juvonen, Nishina, & Graham, 2006; Sigelman & Rider, 2012).

4 Discussion

4.2 Identifying Research Questions for the School Setting

Just as education research requires that problems to be addressed be framed as research questions, the same can be done in actual school settings. In general, the student-related problems faced by most educators include students' engagement in instruction, academic intrinsic motivation, and school-appropriate behaviors (Coffey & Horner, 2012; Gottfried, 1990). Environmental considerations are examined relative to these areas of student

concern to identify ecological factors that undermine student success. When ecological evaluations alone do not reveal all of the contributors to low student achievement, and contending with the identified ecological factors fails to promote student success, then a more individualized approach is required. Research questions for the school setting can be focused on individual students, groups of students with factors in common, entire classrooms, entire grade levels, or entire student populations, depending on the natures of the issues being addressed.

The first step in identifying research questions is to first identify the problem or problems to be solved or the unexplained successes to investigate. As with anything in life, it is rare when a student's success or failure to achieve in school is attributable to only one cause. It is more often the case that several factors compound each other; taken individually they would not necessarily present that big of a boost or threat to student success but together they can make an outright mess of things or put a student in an enviable situation. Therefore, when formulating research questions that ask something broad like, "Why isn't this particular student achieving academic success?" it may turn out to be that the answers are multivariate, which could require a detailed examination of a wide range of relevant factors, each of which could require a custom method of examination. This means that conducting a proper investigation of individual student needs can be time-consuming and, therefore, sufficient time must be allocated to identifying the challenges that are undermining a student's success in school and/or the supports that are helping a student achieve in school and meet appropriate developmental milestones, depending on the research questions being asked. However, in allocating time to identify individual considerations, one must not take too long as doing so will unnecessarily delay the student's receipt of needed intervention if that student is not currently successful in school.

This raises another consideration in developing research questions, which is to make sure they target all of the areas that may be relevant to the problems they attempt to solve. This may seem obvious, but recognizing everything for which data is needed to truly answer a complex question focused on student success, whether on an individual or multi-student basis, isn't that easy or people would be doing it already and we wouldn't have a public education system plagued by all kinds of problems that undermine student success, which we do (Drasgow, Yell, & Robinson, 2001; Kimball, 2002; Soares, 2002; Tonn & Obrzut, 2005; Wolk, 2007).

4.2 Identifying Independent and Dependent Variables

In my experience, many people seem to get stuck at the point of translating their research questions into a list of variables to be measured. Over the years, I have watched IEP teams struggle with translating instructional

needs into measurable IEP goals, which is a reasonably comparable process to identifying variables and formulating research questions. In IEP goal-writing, the variables must be identified in order to formulate measurable goals. IEP goals are essentially hypotheses in which students' IEP teams pursue the outcomes they hypothesize are possible following one year's worth of intervention. Those hypotheses are informed by the data that resulted from asking the original research questions during the assessment phase regarding each student's present levels of performance and capacities to learn. Similarly, research questions posed to address various situations in education seek data that will help educators formulate the hypotheses that will be tested once the problem-solving process advances to that stage.

I suspect that the nexus of identifying variables to be measured and formulating succinct research questions is the sticking point for many educators as they try to conceptualize the challenges they face, which are often large and complex in scope. Further, it may be that researchers realize they need to refine their research questions at the point they identify the variables to be measured. Sometimes, exploring how to answer the questions originally asked leads researchers to realize they were looking at things from the wrong perspective or were failing to take into account important considerations that prompt revisions of the questions. For educators in the field attempting to apply research methods to real-life issues in their schools, they need to know it is acceptable to revise their research questions as they are building and refining their list of variables to measure. Research questions should be honed until they truly fit the situation being investigated (Fraenkel, et al., 2009).

An independent variable in education research is whatever is being manipulated or acted upon in an experimental way. A dependent variable is the result produced by manipulating the independent variables (Fraenkel, et al., 2009).

As a very over-simplified example, if a teacher wanted to test two different methods of math instruction with his/her students, he/she could divide the class into two randomly sampled groups and deliver one type of instruction to one group and the other type of instruction to the other group. The types of instruction are the independent variables; they are the things with which the teacher is experimenting and are, thus, the objects of his/her experimental manipulations. The groups' respective performances would be the teacher's dependent variables. As a rule, independent variables are things that can be done or used differently to produce different outcomes, where the outcomes produced are the dependent variables. The outcomes are *dependent* upon the actions taken with the independent variables, which is what makes the outcomes *dependent* variables.

Relative to formulating research questions targeting problems in school settings, it is often the case that the research is not so much testing different approaches to see what outcomes they produce as they are looking at perplexing or encouraging outcomes and trying to figure out how those outcomes were produced (Patton, 1996). The application of research methodologies in the education setting is often done to figure out after-the-fact how and why something went wrong or what made something exceed expectations (Zachry, 2013).

Independent and dependent variables developed for any line of inquiry have to assume that the subsequent examinations of those variables may take a proactive or reactive approach, depending on the problems or exceptionalities being targeted and how the research questions are framed. This is why the framing of one's research questions is so important. For example, "Why are the school's third grade students consistently below grade level in reading?" will pursue different variables than "Does having the DARE program come into the school and put on an anti-drug campaign actually reduce rates of student substance abuse?"

4.3 *Developing a Proper Method of Data Collection*

The variables to be measured drive the methods of measurement used, which is why the identification of the variables to be measured is such a critical part of the process. The most reliable methods of data collection used in education are those used in the delivery of Applied Behavioral Analysis (ABA), and most often to students with autism. This is because ABA is based on the scientific method and there is evidence that ABA practices are effective with students challenged by autism. However, ABA is effective with all populations as it is based on simple behavior-analytic approaches first identified by Pavlov and Skinner (Drasgow, Yell, & Robinson, 2001; Kimball, 2002).

There is nothing that prohibits educators from applying the scientific method in ways other than those prescribed by ABA. Scientific method stands alone as empirically valid and is something teachers are expected to teach to students as part of the K-12 science standards, so it should be known to educators already. There is no need for peer-reviewed research that targets a specific school-based problem upon which to base a new inquiry so long as educators can apply scientific method to their inquiries in general. Data collection within the context of the scientific method requires the application of empiricism. This means quantification of the variables in some kind of way according to incremental standard units of measure; in other words, one has to be able to count how many of something there are (such as number of correct answers or number of consecutive jumps with a jump rope), how

many times something happened within how many minutes (such as vocal tics or times off-task with a 10-minute period), how long something took before it was done, and things of this nature (Fraenkel, et al., 2012).

Anecdotal information is recorded as qualitative data that adds context and offers explanations for why certain things may have occurred, but they are not objective. Subjective opinion and bias are unavoidable with qualitative data, which makes it unreliable by itself for fact-based decision-making. The evidence measured by the quantitative data has to be taken into account relative to the qualitative data and any disparities between them have to be discussed and explained when the data is analyzed (Fraenkel, et al., 2012).

It can easily be the case that teacher opinion, including the collective opinions of many teachers, does not actually reflect student realities (*Parent on behalf of Student vs. Santa Barbara Unified School District*, 2013), so relying on qualitative data only is ill-advised. Unbiased, objective, empirical data helps balance opinion with fact.

Author and spiritual guru George Jaidar (1995) has observed that attempting to make responsible decisions based on emotions and instinct is akin to trying to build a dwelling out of smoke and that facts are the solid building materials of responsible, adult decision-making. This is the same common sense upon which the scientific method and its reliance on empiricism is based.

Therefore, in identifying the variables that need to be measured and asking research questions that speak adequately to the problems they are intended to solve, it is important to think about how those variables will be measured and how that data will be maintained while the investigation is taking place. Different variables lend themselves to different types of measurement; for example, liquids are logically measured by volume, reading fluency is logically measured in correct words per minute, etc. The availability of applications ("apps") for use with mobile computing devices and desktop computers for data collection in the field expands every day. ABA practitioners have driven the creation of a number of apps that are appropriate for taking data in the school setting. Many of these apps tie back to cloud-based computing platforms that automatically calculate and analyze the data according to approved statistical standards. Many of these apps permit for customization so that the data collected is relevant to the research questions being asked. In the alternate, collecting quantitative data in the school setting can include paper data sheets, hand-held mechanical counters, and audio and video recordings, to name some. The point is to match the data collection tool to the job so that the task of data collection is as accurate as possible with the least amount of imposition on staff. This may require some research on the part of school personnel (M. Coulter, BCBA, personal communication, October 28, 2013).

5 Conclusion

The focus of this paper is the identification of key factors to student success in the school environment, including those that must be addressed through school-based interventions in order for students to be successful as well as those that already benefit students and are worthy of more in-depth analysis. In a research context, identifying these key factors is the function of developing research questions and identifying the independent and dependent variables for which measurement is required, which is a process that can be adapted to fit the school setting to address real needs in a realistic time-frame by competent personnel as discussed above.

Research-based methodologies have already been proven effective and they do not need to be any more complex than each line of inquiry requires. While some research approaches, such as cross-sectional and longitudinal studies, are very involved and time-consuming, and may be the kinds of endeavors educators envision when the use of research-based methods is suggested, these are not the kinds of approaches to use in school settings dealing with immediate needs that require immediate identification and intervention. For educators looking for a streamlined approach to identifying and serving challenges in the school setting, I propose the following basic approach:

1. State the problem you are looking to address in a straightforward manner that makes clear exactly what you are dealing with and trying to address. For example: “XYZ Middle School has experienced a recent increase in the number of students caught with alcohol on campus or being found on campus under the influence of alcohol, affecting students ranging in age from 11 to 14 by resulting in lost instruction to these students while they are participating in disciplinary proceedings and consequences, as well as while they are unavailable for learning due to inebriation; this is known based on the number of alcohol-related discipline referrals that have been received in the last school quarter compared to those received over the prior 16 school quarters.”
2. Formulate draft research questions that speak to the problem(s) you identified in the first step. As examples: "Why has there been a recent increase in on-campus drinking within the last school quarter among XYZ Middle School students?", "What recent changes have occurred that might make alcohol more easily available to XYZ Middle School students?", and "Are the students involved in on-campus drinking incidents connected to each other in any kind of way?"

3. Identify the independent variables that must be measured in order to answer your research questions. For example, the question, "What recent changes have occurred that might make alcohol more easily available to XYZ Middle School students?" may prompt the need to take data on:
    a. Newcomers to the school within the last quarter
        i. Staff
        ii. Volunteers
        iii. Students
        iv. Contractors
    b. New liquor store openings within XYZ Middle School's attendance area
    c. Changes in management, ownership, or staff at liquor stores within XYZ Middle School's attendance area
    d. Any registered sex offenders who have relocated to within the XYZ Middle School attendance area (who may be using alcohol to lure new victims)
    e. Any new illicit drug dealer activity within the XYZ Middle School attendance area (where drug dealers may be giving away alcohol to develop a future drug clientèle)
4. Refine the research questions as needed if information becomes available that makes you aware of factors you had not considered before. For example, you could find that all of the students who have been found on campus in possession and/or under the influence of alcohol at XYZ Middle School all live within a three-block radius of a liquor store that hired one of the student's older brothers within the last few months. If that is the case, then your research question could be amended from "What recent changes have occurred that might make alcohol more easily available to XYZ Middle School students?" to "Has the recent change in personnel at the A-1 Liquor Store in the Lovely Heights area of the XYZ Middle School attendance area resulted in an increased availability of alcohol to students who live in that part of town?" Here, you don't want to go accusing people of things without proof! Scientific inquiry is a lot like other types of investigative work and, without proof, you have nothing.
5. Review the professional literature for any information you can find that will tell you what has already been discovered regarding the kinds of challenges you are facing. Teachers may be able to access the peer-reviewed literature through their former universities as alumni or through other resources made available to them by their LEAs. Lack of teacher access to the peer-reviewed literature is a serious short-coming of the

public school system (Cook, et al., 2003) and supports teacher arguments against requiring research-based approaches in our schools. LEAs are advised to consider partnering through umbrella agencies, such as their local County offices of education or special education local plan areas (SELPAs) to collectively subscribe to the same databases that are subscribed to by major universities, perhaps in collaboration with local universities, to ensure teacher access to the peer-reviewed literature. Here, educators may wish to research how to discuss sensitive issues with parents regarding inappropriate student behaviors, dealing with alcohol abuse among middle school students, and contending with negative influences in the community that negatively impact students, among other relevant topics.

6. Data analysis is beyond the scope of the topics discussed in this paper, but suffice it to say that without properly identified and measured variables and succinctly articulated research questions to drive the inquiry, analyzing the program data becomes incredibly challenging. Data is examined to explore the relationships between the outcomes achieved and the outcomes pursued. Collect and analyze your data to determine, as best as possible, what the most likely causes are for the challenges you are facing. If your data is inconclusive, then your research questions have not explored every possible factor and you've missed something. Figure out what questions remain unanswered and start again at step 2 with formulating your research questions.

The real pedagogical shift that needs to happen, based on my observations and experiences relative to the findings of other researchers, is one in which teachers are not expected to simply regurgitate canned programming and constantly look up new curricula that has already been developed to addressed their students' diverse needs, but for teachers to spearhead the development of appropriate content by applying research strategies in the field to solve real problems as they are happening. Cook, et al. (2003), found that teachers found empiricism off-putting and relied more on hearsay recommendations from colleagues in the teachers' lounge than qualified experts with evidence to support their assertions. That is no mindset to be had by the people responsible for educating this nations' students. While he was serving as the Director of the U.S. Department of Education Institute for Education Sciences (IES), Whitehurst (2004) referred to those of this ilk employed within the public education system as Luddites.

My 29+ years in advocating for appropriate educational outcomes for individual students with disabilities has taught me that antagonizing the ignorant and foolish rarely solves problems. Even if Whitehurst is right about the mentality of his alleged Luddites, calling them names is not likely to cause them to embrace the science they are

rejecting and only serves to polarize stakeholders around the issues rather than facilitate reconciliation, collaboration, and, ultimately, appropriate outcomes for all students regardless of their situations and needs.

While I won't deny a personal disdain for the lazy and apathetic, the self-serving, and those who have entered the field of education for no reason other than summers off, these are not the only individuals in the public education system who do not perform to appropriate standards. There are plenty of well-intended, dedicated people in public education who have simply never been given proper guidance as to how to meet their students' needs while simultaneously meeting their own or the resources to pull it off even if they know what to do. By providing educators with guidance in identifying the key issues in their settings that require their attention, they are empowered to then explore appropriate solutions.

Additional research is necessary to ascertain the efficacy of the process I have recommended herein for the application of research methodologies to tackling important issues in school settings and improve upon it as needed. Likewise, additional research is needed to develop processes and procedures educators can use to reliably analyze data collected in response to their research questions and during the measurement of their variables. The education research community’s efforts to improve the delivery of education in the United States can only be successful if it bridges the gaps between theory and application and it must do so in part by proactively reaching out to teachers with the guidance and information they need in order to apply evidence-based practices in their classrooms with real students. By beginning at the beginning, this paper attempts to start this process.

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