Inquiry Learning in the Chicago Public Classroom

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Abstract

Research on the educational approach of inquiry-based learning is overwhelmingly positive and yet it seems that it is not in widespread use, especially in the Chicago Public School system. The reason behind this observation is not clearly reported. The aim of this project is to determine any obstacles, or any other impediments that exist for teachers (and their students) that are trying to implement this approach into their classroom. A literature review has been completed, along with interviews and surveys of Chicago Public Schools teachers, and surveys of their students.
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Research Question

Can Inquiry based learning be effective (or what measure of inquiry will be most effective) in the science classroom of a Chicago Public School?
Rationale for the Question

In the next year I hope to become a high school science teacher. I have spent a lot of time thinking about where I would want to teach and I always come back to Chicago Public Schools. I know that this is where I want to teach. These are the schools that I grew up in and so I would like to go back to teach. As I think about my teaching and my future classroom, I wonder what it will be like. What does it mean to be a good teacher? What about my class will make it one where students will learn?

I have made it through many educations classes and one word that I have not been able to shake is inquiry. This idea has cropped up in just about every class thus far, and I still have so many questions about it. Even with all of my questions, I knew that inquiry was an approach that I liked; an idea about teaching that I bought into. I have started to believe that inquiry is a way to get away from teaching ‘inert ideas’, and instead teach ideas that will be used and that are useful.

As I started my practicum experience even more of these questions began to popup. At my first practicum site, where I spent almost seven weeks, I was able to observe many classes with several different teachers. For the most part most of these classes were traditional direct instruction. At this site I really did not see any of the tactics and methods in place that I had heard about in class.

I began to wonder why this was, and if the school that I was at was the only one like this or if many CPS schools operated this way. I began to ask my practicum and methods professors and other CPS teachers that I know. I think just about everyone agreed with what I suspected that most schools do not use inquiry much, or at all.
I know that I want to teach in a CPS school. From my classes and the research that I have read on the matter it seems that inquiry is a good way of teaching, and seems to yield better results than traditional methods. I have also come to see that for the most part CPS schools are not using inquiry. So then, here is my greatest point of doubt. Can inquiry be used (as either the whole structure of a class or merely a piece of it) in a CPS neighborhood school? Also, if it can be what is the appropriate measure in which to use it?

This is a question that I deeply want to know the answer to. I have come to believe that inquiry is really a good way to teach, but so far as there is not any inquiry going in the place that I am going to be teaching. I want to know why this is, and if it can be different or if it is a symptom of the structure or the environment of the schools themselves. If inquiry is put into a class a host of questions arise; questions of peer and administration support, questions of assessment and standardized tests, and others. If inquiry is truly to be used effectively then each of these questions must be answered.

Now I don't know that I can put my question to the test in an actual classroom. What I can do, however, is to collect as many accounts from teachers as I can. Teachers who use inquiry, and teachers that do not, teachers that have tried to and no longer use it. From their stories I would hope to find the holes (and the successes) in the inquiry systems that have been tried.
Literature Review

*Introduction*

In answering the question “Can Inquiry based learning be effective (or what measure of inquiry will be most effective) in a ‘neighborhood’ Chicago Public School?” several other questions must first be posed. First of all, a working definition of inquiry must be identified and agreed upon. The word inquiry seems to have become a buzzword or a catchphrase in many educational circles, and so we must come to the true meaning of the word and proceed from there. Secondly, we must look at the difficulties in developing a classroom based upon inquiry. In order to truly understand the potential effectiveness of an inquiry-based classroom, we have to know why it is not being implemented now. What are the obstacles that get in the way, both for the teachers who are trying to implement inquiry, and for the students who are being asked to do it? Finally we must move into the realm of urban education. Schools in an urban setting face their own, unique sets of challenges and difficulties that affect, again, both teachers and students. Until each of these are taken into account, it will be impossible to determine with any confidence whether or not these neighborhood schools in Chicago can actually implement inquiry successfully into their classrooms.

*What is inquiry?*

"The problem is to provide students with enough Socratic guidance to lead them into the thinking and the forming of insights, but not so much as to give everything away and thus destroy the attendant intellectual experience . . ." (Arons, 1993, pg. 280)
In order to answer the question of the effectiveness of inquiry based learning in the Chicago Public Schools it is first necessary to devise a clear understanding of what inquiry really is, and what it should look like when it has been implemented into a classroom. Most authors concede the point that the idea of inquiry has been very widely embraced and that much research has been done to confirm its merits. But this wide study has, as Anderson contends, broadened the area such that the number of studies is in the hundreds or even more. So while this initially sounds like an easy task, after studying different researcher’s interpretations on the matter it becomes clear that there are a lot of different ideas about what inquiry is and how it should be implemented. Alan Colburn states, “Perhaps the most confusing thing about inquiry is its definition.” (Colburn, 2002, pg. 42)

One of the reasons for the confusion is that the term inquiry can be used loosely and different researchers use the word to refer to different things. For instance, when Anderson looks at inquiry, he breaks it into three separate pieces (scientific inquiry, inquiry learning, and inquiry teaching) (Anderson, 2002, pg. 42). Colburn, however, comments that inquiry can refer to two things (a way of doing science and a way of teaching science). Others say that inquiry encompasses “the activities of students in which they develop knowledge and understanding of scientific ideas, as well as an understanding of how scientists study the natural world” (Anderson, 2002, pg. 42). Nearly every author has his or her own way of defining inquiry, and so it seems that the more that you read about inquiry the more the picture of what it is gets muddled.

So then, with this ambiguity in mind, what is an inquiry-based classroom and how can it be defined? Well, as Jolene Hinrichsen points out, it is “not a gathering of
individual learners brought together for reasons of economy”. Instead it is a community where students and teachers share the responsibility for the learning that takes place. What really defines this type of classroom is the fact that teachers are not the sole supplier of knowledge, but that students are brought into this role. (Hinrichsen, 1999, pg. 4).

So how is this achieved and what are the goals of an inquiry-based classroom? It seems that most researchers agree that true inquiry should consist of a few things. The first goal of inquiry is to connect a student’s personal understanding with those of sound science. A second goal of the inquiry classroom is for students to control their own learning by creating investigations and designing experiments to answer their own questions. And finally a third goal would be for students to be able to construct meaning from any data and observations that the student themselves may collect (Hinrichsen, 1999, pg. 7). (Edelson, 1999, pg. 398) (Anderson, 2002, pg. 2).

There are as many ways to implement inquiry, as there are researchers who investigate it, which again, is why the word can sometimes come with ambiguity. Colburn, however, has named three distinct, and easily understandable, ways of classifying the many implementations of inquiry. (Colburn, 2002, pg. 42)

The first method is termed ‘Structured inquiry’. With this usage of inquiry the teacher will provide the students with a problem to investigate, a possible procedure in order to solve the problem, and some materials to carry out the procedure. Now this may seem like a standard lab, but it does differ, because the teacher does not inform the students of the intended outcome. It is left to the students to discover the data and decipher its meaning. (Colburn, 2002, pg. 42)
Edelson describes a method of Structured inquiry called ‘Learning for Use’. In the Learning for Use methodology students use computer software to model problems and collect data. One of the available groups of software is called the “Create a World Project”. This project allows students to move through various geographic and geological scenarios and collect and analyze data. A part of the software called the progress portfolio allows students to keep track of their observations and data in a context that facilitates reflection and inquiry. This method dictates to students a problem and possible methods of solving the problems, but allows the students to make sense of the data that they collect, hence the ‘Structured inquiry’ label (Edelson, 2001, p. 362-365).

The second method, ‘Guided inquiry’, is similar to the first method, yet it differs in one major way. The students are no longer given a procedure to follow, and instead they must develop their own methodology to solve the problem given by the teacher (Colburn, 2002, pg. 42).

Krajcik, Czerniak and Berger describe a model, called “Project Based Science”, which is more like Guided inquiry. In this Project Based Science teachers, through interactions with students, find topics that are of interest to their students, and then pose questions to regarding these topics to their classes. For instance a teacher notices that students become concerned that the classroom bunny has become ill. So the teacher asks: ”what do pets need to stay healthy?” From this point on it becomes the student’s responsibility to answer the question. Krajcik, Czerniak and Berger note how students broke up into groups and devised different tactics to answer the question. Some students began Internet research. Other groups of students began to construct possible diets for the animal, and so on. So in this example we see the Guided inquiry model being put into
practice, as students take a question from their teachers and build processes to find answers, and then collect and make sense of data (Krajcik et al, 1999, ).

Finally we move to the third method (which some researchers will call true inquiry) called “Open inquiry”. In an “Open inquiry” scenario students are responsible for all aspects of a project. The student must come up with his or her own problem, or question, to solve. They then must identify a way to find and answer, by developing a procedure and identify the materials that they will need. The student then carries out their own experiment, collects data, and interprets the results (Colburn, 2002, pg. 42). This span from ‘Structured inquiry’ to ‘Open inquiry’ is often referred to as the ‘inquiry continuum’ and provides a clear framework for viewing the host of implementations of inquiry that are available.

One example of “Open Inquiry” is described by David Hammer, and is called “Discovery Learning”. In this setting Hammer has given students free reign in the classroom. Over a period of several weeks a set of electrical materials have been made available to students, and students are free to create any experiment that they would like. The students have been asked to research a question that they had, and to use the materials provided to seek a solution. The setting is very open and free for questioning, probing, and experimentation. This is the truest form of inquiry, and therefore is the most difficult to incorporate into a class. (Hammer, 1997, ppg. 488-491)

Given the myriad of possible implementations Colburn’s classification system seems to best able to describe the goals and ideals of inquiry. At the same it time allows
teachers, and others who want to implement a system of inquiry, to see the possible levels of integration, and choose one that may be best suited for their classroom.

Why is it hard to implement inquiry?

Now that a working definition of inquiry has been established and attention has been paid to the many ways of implementing inquiry into a classroom, lets examine the potential challenges and barriers when putting inquiry into practice. Inquiry differs greatly from traditional instruction and so new challenges crop up both for students and for teachers.

While much research has been done that indicates the potential positive effects of using an inquiry based science classroom, some researchers question whether inquiry really can be wide spread and used in many different school settings (Anderson, 2002, pg. 4). Although many researchers have become advocates of inquiry methods, and therefore encourage teachers to implement it into their classrooms, teachers are not told how to do it, nor are they warned about the stumbling blocks that may be in place or how to overcome them. (Anderson, 2002, pg. 4). There are however several researchers that have made a point to look for problems that might occur when trying to implement inquiry and have sought to overcome them (Arons, 1993, pg. 4) (Felder, 1996, pg. 4) (Baker, 2002, pg 1).

Problems for teachers

“In a cross-site analysis of a set of case studies of schools that had successfully initiated new approaches to science and mathematics
As stated by Anderson there exist barriers that teachers can face that can be classified into three dimensions; the technical dimension, the political dimension, and the cultural dimension. The technical dimension includes many of the physical and practical issues that crop up as a teacher begins to shift from one style of teaching to another.

Often time teachers who begin a transition into inquiry activities find themselves lacking the time and the energy to design and carry out the types of lessons that are necessary for inquiry. Previously teachers may have been tied to a textbook and relied upon it for projects or assessments. When using inquiry, however, these pre-packaged materials are often of little use and so teachers are

<table>
<thead>
<tr>
<th>Table 1. Traditional—Reform Pedagogy Continuum</th>
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<tr>
<td>Predominance of Old Orientation</td>
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<tr>
<td>Teacher Role:</td>
</tr>
<tr>
<td>As dispenser of knowledge</td>
</tr>
<tr>
<td>Transmits information</td>
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<tr>
<td>Communicates with individuals</td>
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<tr>
<td>Directs student actions</td>
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<tr>
<td>Explains conceptual relationships</td>
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<tr>
<td>Teachers knowledge is static</td>
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<tr>
<td>Directed use of textbook, etc.</td>
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<tr>
<td>Student Role:</td>
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<tr>
<td>As passive receiver</td>
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<tr>
<td>Records teacher’s information</td>
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<tr>
<td>Memorizes information</td>
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<td>Follows teacher directions</td>
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<tr>
<td>Defer to teacher as authority</td>
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<tr>
<td>Teacher prescribed activities</td>
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<td>Completes worksheets</td>
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<tr>
<td>All students complete same tasks</td>
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<td>Teacher directs tasks</td>
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<td>Absence of items on right</td>
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required to develop their own lessons, and new tasks for the classroom. Since many of
the goals have shifted away from those that are sought in traditional education teachers
find that they need to create new forms of assessment. This set of new requirements for a
classroom can be overwhelming to a teacher as the initial costs for shifting to an inquiry
classroom can be very high (Baker, 2002, pg. 249) (Anderson, 2002, pg. 8).

Another set of difficulties that fit into this technical dimension are the challenges
of new teacher and student roles. Table 1 (taken directly from Anderson, 2002, pg. 5)
clearly shows the differences between roles, both student and teacher, from ‘Old
Orientation’ (traditional education) and ‘New Orientation’ (education focused on inquiry
methods). When shifting methods from a traditional setting to an inquiry setting the role
of teacher drastically changes. In traditional learning settings the teacher was the
distributor of knowledge. The teacher was in charge (in terms of deciding what events
took place in the classroom). The teacher directed all actions, and any concepts and
relationships to be learned, were explained by the teacher as well. Students therefore
were the receivers their teacher’s knowledge. A student’s role was passive; they were
memorizers and recorders. In an inquiry setting these roles are, in many ways, switched.
Students gain their own knowledge, while the teacher can now be viewed as a coach or
facilitator (Anderson, 2002, pg. 5) (Felder, 1996, pg 1-2) (Baker, 2002, pg. 249) (Fradd,
1999, pg. 15). In a classroom this shift in roles is drastic and presents difficulties for the
teacher. Students are often reluctant to embrace their new roles, and teachers must shed
the tendency to dispense knowledge.

A second dimension of barriers that teachers may experience comes in the
political realm. Here we see some very difficult aspects of the shift to inquiry; conflicts
among other teachers and administration. Many teachers may fear that administrators will
not understand, or disapprove of, the activates that are going on in their classrooms. In
many schools these types of concerns are valid and there is tension between teachers who
want to include inquiry and administration that prefer traditional instruction (Baker,
2002, pg. 250). Along with lack of administrative and peer support often comes parental
resistance to this new type of setting.

This dimension also includes challenges as far as room constraints and lack of
funds and resources. For instance, according to Baker some surveys have discovered that
40 percent of science classes are taught in classrooms that were not designed for use as a
laboratory (Baker, 2002, pg. 249). Teachers often find that there are too many students
and far too little space. Also physical set up of a room (the positioning of tables, desk,
and chairs) often time does not promote interaction and can make inquiry
implementations difficult.

A third, and final, dimension in which teachers may experience barriers shifting to
an inquiry classroom come in the form of cultural barriers. Anderson describes these
types of barriers as ‘possibly the most important’ (Anderson, 2002, pg. 7). These barriers
are important and can be very difficult to overcome because they include deeply held
views, beliefs, and values regarding textbooks, assessments and issues of college
readiness. Many schools and districts have a very long tradition in a rote style of science
teaching, and to switch the methodology of the class would really challenge the culture of
a given school. This barrier can be further reinforced if the political barriers are also
strongly in place (Anderson, 2002, pg. 7).
Problems for students

"Although inquiry offers compelling opportunities for science learning, there are many challenges to the successful implementation of inquiry-based learning. For example, researchers have documented that children have difficulties conducting systematic scientific investigations ..."

(Edelson, 1999, pg. 399)

Teachers are not the only ones presented with challenges when a classroom shifts from a traditional style of teaching to an inquiry-based classroom. There are a number of difficulties that students can have when faced with this different style of learning. In order to successfully implement inquiry into a class, these barriers to students, including student maturity, motivation, and self-management, must be seriously considered.

One barrier to students that seems to be agreed upon by all research is the level of maturity of the students in question (Felder, 1996, pg. 1-2)(Baker, 2002, pg. 249)(Edelson, 1999, pg. 399). For inquiry to take place students are going to have behave and function in certain ways. For instance, students must be able to work cooperatively and in groups, and students must be able to manage their own learning. Many teachers would argue that a shift in teaching styles to inquiry-based instruction brings out how deficient students are in these areas, which makes learning a very difficult process (Baker, 2002, pg. 249).

In any school setting students must be motivated to learn, but when in an inquiry setting this becomes all the more true. Students who are not genuinely interested in the activities will have little motivation to complete them. This often results in students
deciding not to participate in activities. Or students may participate in activities but in an unengaged manner, which is a big hindrance to the learning process for these students (Edelson, 1999, pg. 399).

In order to engage in true scientific inquiry students must possess the skills to do so. These include designing and performing tasks that an investigation might require, collecting and analyzing data, and interpreting their results. Without these skills students are left unable to conduct meaningful investigations. (Edelson, 1999, pg. 399).

Edelson argues that in order for any of the previous skills to be of any use students must have background knowledge of science content (Edelson, 1999, pg. 400). What good is it for a student to design an experiment about something if they have absolutely no knowledge or understand about the things there are testing. Edelson further points out that students who lack cursory background knowledge and lack the chance to develop it will, again, fail to create meaningful investigations (Edelson, 1999, pg. 400).

Another obstruction to inquiry that is corroborated by several researchers (Felder, 1996, pg. 1) (Edelson, 1999, pg. 400) is the fact that students can have difficulties managing themselves for extended periods of time. When true inquiry is in place students will have the chance to ask open-ended questions and then seek a solution through investigation. For this to be successful students be able to plan out an investigation and then carry it out by themselves, or in small groups, with minimal interference from the teacher. This forces students to take major responsibility for their own learning, which according to Felder (Felder, 1996, pg.1-2) can cause students to go through some of all of the steps that are associated with trauma or grief (shock, denial, strong emotion, resistance, withdrawal, struggle, exploration, and finally confidence). If students fail to
take on this new responsibility Edelson again argues that students will be unable to engage in true open-ended inquiry investigations (Edelson, 1999, pg. 400).

After taking a serious look at inquiry it becomes clear that there are a multitude of challenges that may need to be overcome in order to successfully implement it into a science classroom. Anderson states that while generally research indicates the possibility of successful implementation inquiry there is not a single clear-cut way of doing so. He further points out that the research really does not instruct teachers in how to teach inquiry (Anderson, 2002, pg. 4). All that a teacher can do is to consider the difficulties and the problems that have been raised thus far and seek their own solutions for their own classrooms.

What are problems that are unique to urban educators and students?

The problems inherent to inquiry make it difficult enough to implement it into the classroom. When attempting to implement this method into an urban school, one must take into account the challenges that are present in this setting. Both teachers and students in urban schools face unique obstacles. These obstacles further compound the possibility of incorporating inquiry into an urban class.

Problems for teachers

". . . American schools have been described as the battlegrounds of educational change. They have been regarded as sites of oppositional stances-where students defy teachers, parents, and administrators; where administrators, concerned with keeping their schools open, provide
security and uphold schooling as impermeable; where parents are
disenfranchised from the schooling effort; where teachers view students as
"the enemy"; where training rather than education takes place; and where
daily survival is the paramount concern.” (Montero-Sieburth, 1989,, pg. 332)

Kenneth Howey states that teachers must be trained in order to prepare
themselves for the urban setting. Teachers who teach in these schools will face a number
of difficulties. Among the more common conditions in urban contexts are poverty, drug
usage, violence, and “behavioral norms and beliefs … that are in opposition to those
associated with academic success.” These challenges in the urban context are often
multiplied in the school setting. Howey suggests that this is because teachers, and those
who educate teachers do not understand these conditions, and so do not know how to
effectively respond to them. (Howey, 1999,, pg. 32). A common example, and one that is
cited by Howey, is gang activity. The character and the influence of these complex
relationships affect students and schools in ways that teachers do not completely
understand, and so teachers are unsure about how to proceed.

A similar concern is one surrounding new teachers. Often time, new teachers are
thrust into urban schools, and urban settings, with little to no training in what to expect.
Frequently there is not much support for the culture shock that teachers will have once
they begin in these schools. What is needed, Howey suggests, is that rather than just
throwing teachers in, they must draw on the knowledge of educators, parents, students,
and youth workers who are already in these settings.
Another challenge to teachers in the urban setting is the importance of the classroom and its teacher. Pinkney notes that in many suburban or private schools students will succeed in spite of their teachers. The urban teacher, however, is far more important to the success of their students. There is, therefore, a larger burden placed on the shoulders of an urban teacher. (Pinkney, 1975, pg. 49)

Martha Montero-Sieburth has made the point that teachers become so ‘encapsulated’ when working in urban schools that they do not have the time or energy to reflect upon their practice. Regularly teachers become so overwhelmed by their duties that they “can barely function” (Montero-Sieburth, 1989, pg. 337). Teachers become entrenched in the daily structure of the school, and therefore tend to not develop relevant knowledge to their classrooms and students. These teachers “carry theory around in their heads, but they often do not know how to apply this knowledge in the given context because they are so immersed in practice” (Montero-Sieburth, 1989, pg. 337). These daily routines suck up a teacher’s time.

This “encapsulation” results in the isolation of many teachers. This isolation further restricts a teacher’s capabilities. With no one to speak to teachers do not have the ability to develop their own curricula, and so often are forced into using the textbook as the main source of curriculum materials and ideas (Montero-Sieburth, 1989, pg. 337).

Bell notes that teachers in urban settings seem unwilling to make bonds with other teachers, or pool their knowledge and skills for the common good. He attributes this to the fact to a lack of time, energy, and skills. Bell also remarks that the structure of the school, few common prep periods, small teacher lounges, lack of open area, etc. creates
barriers and fosters this isolation, which adds support to Montero-Sieburth ideas of teacher encapsulation and isolation.

Even further compounding the matter is the fact that teachers have to present ideas to diverse categories of students: bilingual students, vocational training students, etc. Montero-Sieburth notes that this predicament often leads to ‘watered-down’ materials and expectations, where less questioning takes place and more idle ‘seat-work’ is required.

Teachers in urban settings face some of the most difficult challenges to overcome. The common conditions in many of these schools and their surrounding community present problems that are often time compounded, rather than solved by, the school. Far too often teachers are thrown into these settings with insufficient training and once there, are not given the support that they need. This lack of support leads to a new set of difficulties; such as the encapsulation and isolation as stated by Montero-Sieburth. These challenges that are unique to the urban teacher even further hamper a teacher’s ability to design an inquiry classroom.

Problems for students

"The "at-risk" urban students of today - as characterized by their poverty-stricken backgrounds, social and familial stresses, lack of control in their lives, limited views of their own futures, and lack of self-esteem and self-identity - frequently tend to be members of underrepresented ethnic or racial groups. These students have different social, cultural, racial, and
linguistic backgrounds than their White, mainstream culture counterparts.”

(Montero-Sieburth, 1989,, pg. 336)

Students in urban settings, as well as teachers, face some overwhelming challenges in their schools. Lists of these problems and difficulties can be quite extensive, but seem to often include: low academic expectations, nominal importance placed on education, minimal parental involvement, exposure to drugs and violence, and negative peer socialization.

As Montero-Sieburth has noted school structure regularly forces watered-down materials and expectations from teachers in urban schools. Howey observes that students internalize this lowered expectation and in turn students do not expect much of themselves in terms of their own learning and school-work (Howey, 1999,, pg. 33).

Exacerbating this challenge to students, is that fact that media and research seems to reinforce the idea that these schools and the students in them are problematic and troublesome. Students are constantly reminded of how ‘bad’ their schools are, “even though they already know that from their daily experiences” Students must live down the overshadowing image of ‘failure’ of the urban school (Montero-Sieburth, 1989,, pg 336).

Montero-Sieburth observes another issue that even further worsens this problem of low expectations and image of failure. Outsiders tend to use single-factor analysis to explain away many of the issues that arise in urban schools. Montero-Sieburth cites the following examples: “problems are solely a result of the "matriarchal" patterns of Black families or of the "machismo" of Hispanic males” (Montero-Sieburth, 1989,, pg. 336).
She goes on to say that this attitude leads to a dismissal of larger social and political problems, and leave the focus of the problem on the students and the family.

Many of the homes that these students are coming from have only one parent. Regardless of whether or not there are one or two parents at home, it is commonplace they spend much of there time away from home working long hours to make ends meet (Howey, 1999,, pg. 34). This then results in low parental involvement for many students in urban schools. Howey suggests that students fill the void of the parents through, television, movies, music, or through interactions with peers, which are often times harmful factors.

Out of school factors probably make up the biggest impediment to a students success in an urban school. Drugs and violence, and negative peer socialization are often all cited as big factors that hinder a student’s success.

Figure 2 (taken directly from Bell, 1979, pg. 71) demonstrates how in many urban schools students (as well as teachers) experience a perpetual cycle of frustration. Powerlessness leads to a feeling of incompetence (with adds support to both Montero-Sieburth and Howey’s ideas of a student’s low expectation of themselves), which then
leads to withdrawal from school and continued isolation. This isolation and withdrawal
leads to lack of energy, and motivation, which is followed by a reduced desire to
constructively participate in class.

Both students and teachers that populate the urban school face enormous
challenges when trying to succeed in their schools. Low academic expectations, minimal
parental involvement, communities exposed to drugs and violence, and negative peer
socialization are only some of the problems and obstacles that students will face when
attending school in an urban setting. Teachers hit the same wall that their students do by
experiencing insufficient training and lack support that they need. Teachers also face
encapsulation and isolation as they struggle to make it through one day at a time.

Conclusion

In many aspects of schooling an education there are obstacles and challenges that
need to be overcome. The attempt to put inquiry into an urban school is clearly one such
aspect. This is because inquiry itself has a large set of challenges to be met, and so when
the urban schools and community are thrown into the mix the problems become all the
more difficult to overcome. Time and energy are doubly scarce. The lack of collaboration
and the feeling of isolation felt in the urban schools become heightened when a teacher
tries in implement inquiry. The political barriers that exist in all schools are difficult
enough to break down, but these are even more reinforced in the urban schools. Teachers
who implement inquiry into an urban setting face a daunting task.

Students in urban school, also, have many difficulties ahead of themselves when
they are asked to participate in inquiry classrooms. Inquiry often requires a rather mature
attitude and a high level of motivation in order to be successful, and this is in direct conflict with the expectations and motivations most urban students. Inquiry places very high expectations onto students, which can be quite a shock to students who are used to very little expectation.

Despite the innumerable obstacles teachers, and researchers have not discounted the possibility of inquiry in urban schools. Anderson states that: “there is research indicating that under the right circumstances inquiry teaching is possible. Researchers have through an extensive search process located schools where “reformed” teaching was typical of a school’s science or mathematics department” (Anderson, 2002, pg. 7). Pinkney agrees, but remarks that in order for urban schools to a success teachers must maintain a deep level of commitment (Pinkney, 1975, pg. 51). It becomes that researchers agree that inquiry can be implement in many school, including urban school, but they also agree that it does not merely happen on its own. The implementation requires commitment, time, and energy and a certain level of support from either administration or peers. But, given a correct context inquiry should be possible an urban setting. So while inquiry may not spring forth for every neighborhood Chicago Public School, these schools are not precluded from implementing inquiry, although many obstacles are in place to make the process a difficult one.

This research provokes many questions regarding the possibility of implementing inquiry in to an urban setting, such as a Chicago Public School. In order for these questions to be answered it will be necessary to spend time interviewing and surveying teachers and students that are currently in inquiry settings.
Data Collection

Data Sources. In order to collect data about the effectiveness of inquiry based learning in the Chicago Public Schools it was necessary to find teachers in that setting that actually use this method in their classrooms. At one CPS school I was able to find a group a physics teachers that used, or at least at one time had used, inquiry. At this school I was able to interview two teachers that currently are using inquiry and a third that has stopped using inquiry. To add to my data I also anonymously surveyed one class of each teacher about how they learned in their physics classes. Furthermore, I made observations, for several classes, of each teacher. Finally I surveyed ten teachers from around the CPS about the successes and difficulties of their experiences implementing inquiry. Blank copies of the interview, and the survey can be found on the appendix.

Ethics Statement. Participation in any surveys, interviews, or other means of research is completely voluntary. Participants may choose to opt out of the any survey of interview at any time. The names and information of all participants will remain confidential. Participation from students is completely voluntary, and all information gathered from students will be acquired and presented anonymously.
Data Summary

Mr. Kipp

Interview with Mr. Kipp. To find an answer to the question ‘Can Inquiry based learning be effective (or what measure of inquiry will be most effective) in a Chicago Public School?’ it was necessary to spend time in the classrooms of teachers who are currently using, or have at some point in their teaching used, some form or implementation of inquiry based learning. At Campbell Public High School the researcher spent time in the classrooms of three physics teachers. Two of the three teachers use inquiry as the primary method of teaching in their classrooms. The third teacher has used inquiry for a short time, but has since moved away from it. Additionally the researcher spent time observing each teacher’s classes and has surveyed students from the classes of each teacher.

One of the questions that the researcher had that drove him to ask the question was: why was inquiry in use in only a few classrooms around the city? Mr. Kipp was the perfect teacher to ask, about this phenomenon. Mr. Kipp is normally a chemistry teacher who is currently teaching a physics class. At the beginning of the year Mr. Kipp was following the curriculum set forth by the other two teachers in the physics department. This curriculum is wrapped up in an inquiry style. The researcher asked Mr. Kipp about this experience and he told him that it was not a positive one, and that he only stuck with the inquiry style for two weeks. After that time he changed the style of the class drastically, moving to a style that aligns with a more traditional approach.
The researcher asked Mr. Kipp to discuss his decision and to present the reasons that he felt that he must move away from the inquiry method. Mr. Kipp presented three reasons as a rationale for moving back to a traditional, didactic method.

His first response was that his philosophy of education did not align with those of the other physics teachers he worked with, Mr. Dunmire and Mr. Lobel. Mr. Kipp specifically mentioned that he felt that the inquiry method is merely a way to enamor students with learning, or in Mr. Kipp’s own words to provide “a glorious educational experience”. While this may not be a bad thing, Mr. Kipp feels that it should not be the aim of the education that the students are receiving. Instead he feels the classes that he is teaching should instead be preparing students for the rigor of the university.

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<tr>
<th>Why does not use inquiry</th>
<th>Relevant Philosophy</th>
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<tr>
<td>Slow pacing</td>
<td>“I believe that in life we are rewarded for effort”</td>
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<td>Lack of rigor</td>
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<td>Lack academic challenge</td>
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<td>Insufficient content coverage</td>
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<th>Challenges of inquiry</th>
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<td>A slow pace which frustrates students</td>
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<td>Students who do not understand concepts are expected to lead and drive the class along</td>
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“The bottom line is that you need to teach them to meet challenges because when they go to college whether they study philosophy, theology, or physics if they don’t know how to meet academic obligations they are not going to do well.”

Here we see that Mr. Kipp sees how necessary it is to prepare students for college, and he points out time and again that as he sees it the one major fault of inquiry lies in its failure to challenge students. In the traditional setting students have rather large expectations put on them, including class and homework, tests, quizzes, and the like. Mr. Kipp feels that these qualities are essential to the preparation of his students and finds that they are lacking in the inquiry model. He commented, that from the students he had spoken to, they found his class to be more difficult, and more of a challenge, than Mr. Dunmire’s class, a result by which he was not surprised.

For Mr. Kipp this challenge and rigor are the most important aspects to impart to his students. He feels that to teach students how to work hard will be teaching them how to succeed. He plainly told the researcher “I believe that in life we are rewarded for effort” and he uses this belief when structuring his teaching. He sees that his class should be about learning, by taking responsibility for you work, study habits, and the like, and that schools should teach content in this way so that when students will be of the right mindset for college.

Instead what he sees is a very slow paced classroom, which, he feels, frustrates students. Mr. Kipp questions why he would allow a student to fumble through an idea for several days when a few words from the teacher would answer the question.

“[Mr. Dunmire and Mr. Kipp’s classes] spend and entire period investigating the effect of mass on a pendulum. And after an hour and a half that find that it has no effect.
They spend another long period investigating how does amplitude affect the period of a pendulum. And I think that that can be explained in class, and accepted. If you don’t believe me then we can test, but test it very quickly.”

Mr. Kipp’s final issue with the use of inquiry lies with the students’ abilities in the classroom. In the inquiry model students would be constructing knowledge on their own and with peers. Mr. Kipp does not want students who do not understand the class concepts and ideas to be explaining it to others. He says, “Certainly, what I don’t need is somebody who is still trying to grasp the material go up and kind of fuddle through it.”

*Student Surveys.* To better understand the effectiveness of the different teaching methods, the researcher also surveyed students in Mr. Kipp’s class. It was a brief survey, including only six questions. (A blank copy of the survey is included in the appendix).
Nearly half of Mr. Kipp’s students say that they enjoy the class, 57%, and about the same say that they find it interesting, 50%. Nearly all of the students in the class find that the class is difficult, 85%, which is one of Mr. Kipp’s goals for the class. Interestingly though nearly 80% of Mr. Kipp’s class is not able to keep up with the material presented in class. Finally, a majority of the students, almost 93%, are bored in class. Several students made the point of adding the fact that they regularly fall asleep in class. The final question addressed whether given the option, the student would take the class again. The fact that the exact same number of students, who said they were bored, also said that they would not take the class again.

**Observations of Mr. Kipp.** The researcher also made observations of several of Mr. Kipp’s class sessions. The first thing that anyone would notice when entering Mr. Kipp’s classroom was the low key, relaxed atmosphere. They was rather loud music being played in surround sound, that stayed on for the duration of the class. Mr. Kipp himself was dressed in jeans and a brightly colored Hawaiian shirt. The structure of the class seemed somewhat unstructured and fluid. Some students seemed to work well in this setting, but others were completely off task. For those who were working, the task at hand was a lab involving the refraction of light. It seemed to the researcher that many students were having difficulties completing the activity, and one student even asked the researcher to help her complete the assignment. The overall impressions of the class were that the class seemed as though it would be a fun place to spend time (because of the relaxed atmosphere, the music, and the fluidity of the class structure) but it appeared that many students were not taking the opportunity to push themselves to learn.
Mr. Dunmire

Interview with Mr. Dunmire. One of Mr. Kipp’s colleagues and fellow physics teacher Mr. Dunmire was also interviewed. Mr. Dunmire is an avid proponent of the use of inquiry in the classroom, and was more than eager to share his thoughts on the subject with a prospective teacher. His first task was to breakdown his understanding of inquiry. He likened learned to a series of islands, islands of knowledge that need to be connected. Bridges are built from island to island to connect ideas and beliefs. What is of interest to Mr. Dunmire is how the bridge is built, by whom it is built and the manner it is walked.

“It seems to me that the brain is very particular about how the bridge between two ideas is walked, in the sense that if the teacher says… the reason that this idea is connected to this other idea is blah blah blah… so there is a bridge being walked by the student from the first idea to the second idea. But in my experience that kind of a bridge that is pointed out to a student by a teacher, doesn’t last it falls down, and what you have left, at best are these islands of thought that once again are totally separated by each other, or might even totally disappear and kind of sink under the water of the student’s memory.”

“However, if a student is standing on the shore of one island but sees that there is this … other idea that I need to connect to somehow, and if they figure out how to make that connection by articulating it, by asking questions that would point from one place to another, that when they are involved in that process, they are still walking the bridge, but now they are leading there own path, and so the bridge lasts, and that learning is significantly different in the outcome and in the endurance of the ideas, than it is if the teacher shows the way rather than the student building the bridge themselves. I guess the
difference in this analogy is walking a bridge that someone else built and building a bridge yourself and then having to walk it"

For Mr. Dunmire this personal building of the bridge is the crux of this inquiry thing. The researcher asked him about his thoughts on the origin of the questions, and whether it was important that questions originate from the students. Mr. Dunmire responded with his understanding of the importance of this view, but also mentioned how difficult it can be to implement this in the real world setting.

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<tr>
<th><strong>Why use inquiry</strong></th>
<th><strong>Mr. Dunmire on Inquiry</strong></th>
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<td>- Students have to create their own bridge between their &quot;islands of knowledge&quot;</td>
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<td>- Students need to connect the place where they believe to what they are learning</td>
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<td>- Often students' intuitions are wrong, and yet we often do not know about it</td>
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<td>- Students need to be active and participate in learning, and wonder about the outcome.</td>
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<th><strong>Relevant Philosophy</strong></th>
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<td>“I think that learning requires students to be active in the process of making connections, and I do think that inquiry is one of the ways to make that happen”</td>
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<td>“It seems to me that the brain is very particular about how the bridge between two ideas is walked…”</td>
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<th><strong>Challenges of inquiry</strong></th>
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<td>- A teacher must be totally sold out for it (expend much time and energy)</td>
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<td>- Much skepticism of the method</td>
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“Some teachers I think will say that nothing you do should be done apart from what students actually indicate that they want to do because of questions that they have. Arbitrarily starting some new topic on some unit would be a limited approach according to this view because it is sort of coming from nowhere … and it is not driven by questions that students are trying to pursue on their own. I think that’s a kind of purists view on one end of a spectrum. … I think that kind of view of inquiry teaching is almost non-existent because it is quite difficult especially in the context of thirty kids of so.” The researcher did press Mr. Dunmire on this issue, asking him if he thought it possible to implement this purist view of inquiry into a normal Chicago Public High School. After a moment of thought he said, that yes, he thought it possible, but that the teacher must be totally ‘sold out’ for that method of learning, and that otherwise it would not be possible.

This bridging of ideas is strongly tied to the beliefs that students hold, and how they are formed. Another reason that Mr. Dunmire uses inquiry is to confront these ideas and construct scenarios to put them to the test.

“The goal of inquiry is not only to make students active in their learning but to also make their true ideas active in the learning process. I think you mind can be active without it ever connecting to what you think. Physics challenges that because it is such a conceptual subject that is always appealing to people’s real life physical experiences and real life physical intuition. It is often that intuition is wrong, and it’s often that that intuition never gets tapped unless you ask students question that take them to the place where they have to think about what they really think about and how it relates to what they are learning about, and how can I understand the two together. So that eventually you have helped the students to move their true ideas to a different place, rather than
hoping that by just telling them the known facts that they will leave their former ideas and come to your new way of understanding.”

Mr. Dunmire continued by saying that people do not leave their beliefs behind, just because a textbook, or a teacher, says something else. “You can’t tell someone the belief system that is the best to have developed and expect them to follow that.” He cited examples from his class where students rejected ideas presented in class and so were forced to, in a real way, confront the belief.

This led Mr. Dunmire to discuss a bit more about why he chose to use inquiry and the issues that come about in that decision. One of the things that came up was Mr. Dunmire’s disagreement with Mr. Kipp. Mr. Dunmire understands that Mr. Kipp has this view of the world that effort equals success, but vehemently disagrees with it. Instead Mr. Dunmire would say that success will come when students are able to approach problems with the ability to use the available resources to come to a solution. This belief, that is so fundamental for Mr. Dunmire shapes the way he structures his class.

Another issue that was raised was sustainability, or ability to keep up the energy to do the necessary work. Mr. Dunmire said “Mr. Kipp kicks my butt in this regard.” He goes on to say that sustainability should not be that important, and that when teachers being to reproduce lesson, units, etc. they get into trouble.

“If you stop learning as a teacher, and just start reproducing then you are serving yourself in the classroom, and that’s about it.” He also commented that he would rather be exhausted at the end of each day than reuse the same thing over and over again. Here it was plain to see how sparse his time was and how much energy he expended in a given day. It was significantly more that Mr. Kipp.
Student Surveys. The researcher also surveyed Mr. Dunmire’s class using the same six-question survey as with Mr. Kipp’s class. The results of the survey are much different than that of Mr. Kipps class. When responding to whether they enjoyed class, whether they were able to keep up in class, and whether class was interesting more than 60% of Mr. Dunmire’s class responded affirmatively. About 50% of the students thought that the class was difficult, and about the same number would choose to retake the class given the option. The most unanimous response was that very few students were ever bored with the class.

Observations of Mr. Dunmire. The researcher was able to observe several classes taught by Mr. Dunmire. The first class was a class of freshman physics. The class was
divided into three distinct time chunks. The first was a discussion of Newton’s second law of motion (Force = mass * acceleration). The second was a time of ‘white-boarding’. This refers to students working out problems in a small group on a white board, and then presented their solutions for discussion. This was followed by a lab activity. The chunk time in this class that I found most interesting was the white-boarding. It was here Mr. Dunmire demonstrated the questioning technique that he had alluded to in the interview. In one instance the topic of discussion surrounded the relationship between acceleration and velocity. The goal was to get students to see that knowing an object’s acceleration tells them nothing about the numerical value of the velocity. One student asked a question about the relationship and Mr. Dunmire responded by asking another student “Please respond to that question, and do not use the words increase or decrease.” The student took some time to respond to the question, and when he did respond he did not ‘get the answer right’, however it was clear that the student was think, and trying to construct a response that fit Mr. Dunmire’s parameters, and also made sense to himself. This type of questioning and thought provocation is what Mr. Dunmire really seems to be aiming for. Interestingly the class never resolved the issue when the time for this activity had expired, and so for the time they let it be.

Mr. Lobel

*Interview with Mr. Lobel.* The third teacher that was interviewed from Campbell Public High School was Mr. Lobel. Mr. Lobel is a first year teacher that has switched over from a career in explosives engineering. Mr Dunmire and Mr. Lobel use the same
curriculum and for the most part keep up with one another as far as activities and content go, meaning that Mr. Lobel also uses an inquiry method in his classroom.

| Why use inquiry | - Cannot tell someone to change their mind if they have experienced something different  
|                | - Students must confront their misconceptions |
| Relevant Philosophy | “There is no connection until they are able to break down that misconception … and memorizing and repeating does not allow that to happen” |
| Challenges of inquiry | - No success with 'free' inquiry  
|                       | - Forming questions that keep the class on task and curious  
|                       | - Teaching this way takes a long time, so content is sacrificed |

Mr. Lobel started the interview by discussing the kinds of inquiry that are going on in his classroom. He used the term ‘guided inquiry’ to describe it. By this he means that students are given problems to work out, but that the results, conclusions and meaning behind them are left for the student to seek out. He also mentioned how he had experimented with ‘free inquiry’, by this he meant a setting where students generated the topics of study and formulated questions to answer. He found, however, no success in this method, and comment that it was difficult even in the guided setting to keep students focused on the topic at hand.
“It takes a lot more to guide the question. Things can go off topics or out of where you want them to go quickly for bad reasons, but even students who are interested in it can take it off in a direction that you didn’t expect. The main things is trying to setting up the questions so that it is not discovering everything … you have got to make sure the questions go where you want to go, everything you observer has physics in it, and not just one thing. This is particularly hard in inquiry. If you were only explaining things, you could do a little hand waving and make it ok, … but it can be a huge factor in inquiry”

Another point of hardship for inquiry is that it takes longer to accomplish something than does a more traditional method. Mr. Lobel definitely feels this struggle.

“The other thing about inquiry is that it takes longer… It is a much slower pace. I can tell you F=ma, and probably get you relatively competent with the formula rather quickly, but it would be tough to really get that idea across in that time.”

Mr. Lobel’s began to shift his focus to the importance of true understanding and assigning meaning to the things that are being learned. He cited an example of how people can be competent in some skill, and yet have no understanding of what that skill really means of the relationships involved in the skill.

“I have many engineering friends that could do a lot of calculations and accurately, but either the sense of numbers … they might come up with a mass of the earth at 30 kilograms … that doesn’t make sense, there is nothing there that makes sense. That is really hard to get. What we are hoping to do in inquiry is to teach a sense of what is going on and a sense of how to interpret that. So then we teach two or three things, but when they arrive at something that they haven’t learned that can approach as ‘I can learn this’.”
Mr. Lobel continued to talk about the meaning and the understanding behind things, and their significance and importance. He uses the example for class where students study Newton’s third law of motion (every force has an equal but opposite reaction). Mr. Lobel sets up a scenario with two carts of different sizes that collide with each other and asks the students to compare the forces on each cart, they in fact are equal.

“The importance of inquiry, from my feeling, is exactly that they will recite back ‘every force has an equal but opposite reaction’ and then go forward and say that the bigger cart has a bigger force. There is no connection until they are able to break down that misconception … and memorizing and repeating does not allow that to happen.”

*Student Surveys.* As with the previous teachers the researcher surveyed Mr. Lobel’s students. The results of this survey were more similar to Mr. Dunmire than to Mr. Kipp.

![Graph 3 – Mr. Lobel’s Students](image)
About half of Mr. Lobel’s class, 44%, said that the class was interesting, while 55% of the students found themselves bored in class. Interestingly, the same number of students also said that they would take the class again, if given the option. 66% of students said that they enjoyed class, even though 77% of them noted that the class was difficult. The most notable thing able Mr. Lobel’s students was that no one said that they were unable to keep up with the material.

*Observations of Mr. Lobel.* The researcher was also able to spend several sessions observing Mr. Lobel’s classroom. Similar to Mr. Dunmire’s class, Mr. Lobel’s class was broken into two separate chunks of time. The first part included a discussion of a few graphs that were on the board. Mr. Lobel spent nearly forty-five minutes asking about the these graphs should look if they were to represent some scenario that they had previously seen. The discussion was amazingly slow paced, and after some time it seemed that students were tiring of the topic. Mr. Lobel demonstrated what he had said earlier, about phrasing questions in the just the right way to keep students on task, but still curious. It took some time for Mr. Lobel to put these questions, and for a good thirty seconds, he would think about what he want to ask before he asked it. It seemed that the students, were used to this kind of behavior, as they made not mention of, nor did they question what was going on. When the questions were finally put it was clear that Mr. Lobel was probing students to think about what the graphs meant, and how they connected and related to the physical scenario that they had seen.

*Teacher Surveys*
Teachers from around the Chicago Public School system were surveyed about their experiences using inquiry in their classroom. A blank copy of the survey is included in the appendix. A number of interesting trends came out of the surveys, as well as some interesting comments by teachers.

The most poignant piece of information from the surveys was the one question that just about every teacher agreed with. The question asked teachers whether teaching inquiry was more difficult, required more time, and required more energy. Teachers were asked to choose from strongly agree, agree, neither agree or disagree, disagree, and strongly disagree for each of the three questions. Nearly every teacher marked either agree or strongly agree for each question.

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<th>Comments from Teacher Surveys</th>
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<tr>
<td>- “The hardest challenge is creating experiences … the yield authentic experiences”</td>
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<td>- “Students frequently engage in discussions directly related to the misconceptions they have”</td>
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<tr>
<td>- “Students who learn through inquiry are more likely to question their understanding”</td>
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<tr>
<td>- “The students’ curiosity and desire to make connections would be the driver of their progress, the motivation for their learning”</td>
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A second note of interest is that all of the obstacles that were presented in the literature were checked off in the surveys as obstacles that teachers are currently facing. Not every teacher checked off every box, in fact each teacher checked off a distinct set of obstacles that they faced.
The surveys provided a very useful piece in forming a complete answer to the question of inquiry. The surveys along with the interviews of teachers, the surveys of their students, and the observations of their classrooms have provided a number of ways at peering into the world of inquiry in the Chicago Public Schools.
Data Interpretation

While trying to understand the data that has been collected it is important to consider it in light of the literature that has been examined. Several of the portions of data that have been collected agree very strongly with the literature that has been presented earlier.

Obstacles to inquiry. Researchers Anderson and Baker cite a number of impediments to the successful implementations of inquiry including commitment to textbooks, challenges of assessment, difficulties of group work, new teacher and student roles, conflicts with teachers and administrators, and lack of resources. The surveys of teachers around the Chicago Public School system corroborated this literature. Given a list of the previously mentioned obstacles the teachers collectively marked each of the options. What is of further interest is that these obstacles to inquiry are present in varying forms in each school. Not every teacher marked every option. It became clear that each teacher perceived their own set of obstacles that were unique to their own classroom. Interestingly, even teachers from the same school identified different and unique sets of obstacles that they faced. But, when compiled, the list of teacher-identified obstacles was equivalent to the list identified by the literature.

Student Surveys. The surveys that were received from the students of Mr. Kipp, Mr. Dunmire, and Mr. Lobel provided some fascinating information. Comparing the classes’ responses provides a chance to make sense of the information provided. The following graph is a combination of the graphs presented in the data summary section.
In this graph it becomes clear that for three of the six questions there was not much of a noticeable difference in the responses. However for the remaining three responses the differences between the two types of classes were very pronounced.

The first of these questions was; Are you able to keep up with the class? The students in the non-inquiry class reported that only twenty percent of the students felt that they were able to stay afloat in class. The inquiry classes were just the opposite, with over eighty percent of the students feeling that they could keep up in the class. This seems due, in part, to the slower pace of the inquiry class.

The second question in which the responses were dramatically different was ‘Are you bored in class?’ In the inquiry class just under forty percent of students reported
being bored in class. The non-inquiry class was again very different; over ninety percent of the students responded affirmatively. This statistic seems very interesting, but by itself it is hard to grasp any meaning from it.

So then, the third question also needs to be looked at. In this question students were asked ‘If given the option to go back to the beginning of the year, would you retake this class?’ Less than ten percent of the students in the non-inquiry class reported that they would, while over fifty percent of the students in the inquiry based class responded that they would retake the class.

When the statistics from the last two questions are coupled together it becomes evident that there is something attractive about the inquiry classes that is lacking in the non-inquiry class. Just what this something is, is not clear from the questions in the surveys. What is clear though is that students seem to prefer the inquiry class, at least somewhat, to a traditional approach.

Teacher Philosophies. One thing that has come out of the interviews with the teachers was the importance of a teacher’s personal philosophy of education. Mr. Kipp stated that he “believes that in life we are rewarded for effort” and so this philosophy shaped the way that Mr. Kipp structured has classes. His classes then, were very challenging, fast paced, and required much work from students. Mr. Kipp’s main concern was giving his students a setting similar to that of a college class in order to prepare his students.

Mr. Dunmire and Mr. Lobel had very different philosophies. Both of these teachers had philosophies where making personal connections to the class material, and confronting misconceptions were highly valued. Again, these teachers’ classes were
greatly shaped by these philosophies. The classes were much slower in pace, and often gave control of the class to the students. What has become evident, then, is that the teachers who are using inquiry seem to have a philosophy that is aligned with the values that are wrapped up in inquiry.

The success of the implementation seems to be tightly linked to the philosophy of the teacher. Those teachers who value the personal connections that are made by students seem to feel that inquiry is a good way for that too happen. On the other hand teachers who are more concerned with academic challenge and college preparation seem to see little value in the slow paced, student driven class. For this reason it is easy to see why these teachers would have a difficult time making a go of inquiry.

Inquiry is Possible. A final interpretation regards the actual possibility of using inquiry-based learning in the Chicago Public Classroom. Both Mr. Dunmire and Mr. Lobel claim to use inquiry on a regular basis in their classrooms. After conducting interviews with both of these teachers it was clear that they were very passionate about this approach to teaching. In both cases the interviewer only asked for about ten minutes for the interviews, but both Mr. Dunmire and Mr. Lobel continued on for over a half an hour. Much of this time was spent in defense of the inquiry method, as though they were trying to convince the interviewer that inquiry was really worth all of the trouble.

The claim of both of these teachers was that they are regularly using inquiry. In order to confirm these claims attention must be paid to the student surveys and the classroom observations. As was discussed in the data summary section the observations revealed that the classes of both Mr. Dunmire and Mr. Lobel did seem to embody the ideals of inquiry. It seems as though they were able to create classes were inquiry was put
to use. Students were regally taking ownership of the class. Activities were being used to
draw out questions and confront misconceptions. These classes did really seem to fit the
inquiry ideal.

The student surveys added a second dimension the question of the successful
implementation of inquiry by Mr. Dunmire and Mr. Lobel. The level of interest in the
classes, along with the ability of the students to keep up with the class content seems to
indicate that from the students perspective the classes trying to use inquiry were effective.
It seems that that these two teachers have been able to put inquiry to use in an effective
way in their classrooms. This finding is a very important one, as it directly relates back to
the initial questions of the project, with an affirmative answer.
Conclusions

This foray into the approach of inquiry has yielded some very interesting conclusions, as well as provoking many further questions on the matter. Three main conclusions have become clear after taking in to account the research and the data summary and interpretations. First, teachers that are using inquiry seem to be deeply, and philosophically committed to it. Secondly, obstacles to inquiry do exist, but do not seem to cause teachers to abandon inquiry. Thirdly, structured and guided inquiry, as outlined by Coulburn, can be implemented in the Chicago Public Schools.

It has become visible that teachers that are using inquiry are deeply committed to it. This seems to stem from these teachers’ philosophies on education and on life. Both Mr. Dunmire and Mr. Lobel agree that any true learning must originate with a connection to the student’s own experience, and that any other ‘learning’ will be fleeting and useless to the learner. This belief is rooted very deep in the teachers that are using inquiry, and does not seem to be present in the teachers that choose not to use inquiry in their classrooms.

This conclusion leads directly into the second conclusion; obstacles to inquiry do exist, but do not seem to cause teachers are already using inquiry to abandon it. It seems that since the inquiry approach is so rooted in and aligned with the beliefs of the teacher that uses inquiry, that no quantity of obstacles will prevent these teachers from using inquiry. These obstacles merely become roadblocks that must be navigated, rather than impediments that stop the implementation of the approach.
Finally, it has been proven, that to at least some extent, inquiry can be implemented into a Chicago Public School. Coulburn provides the three-tiered structure of Structured, Guided, and Open inquiry, and from classroom observations, student surveys, and teacher interviews, it has been shown that the first two tiers of this structure can be implemented into a CPS school. Both Mr. Dunmire and Mr. Lobel have been able to construct classes where students use a guided inquiry method to build their knowledge of physics. From the interviews it was clear that this was the teachers’ intent, and its successful implementation was confirmed through the observations of the classrooms and the interviews with the students. These teachers also made similar comments regarding open inquiry, both saying that open inquiry seems nearly impossible to implement. Truly open inquiry requires that students suggest questions to study in class. It is very difficult to mesh this with a system that has state standards and specific content and curriculum goals.

Now that the project has been completed it has become clear that there were a few very substantial limitations. The chief limitation was the number of teachers that were interviewed. The interviews were somewhat lengthy, but extremely helpful to resolve the question at hand. Each teacher had their own story that for them solidified reasons why they wanted to use inquiry or why they did not. Interviews with more teachers would have meant more of these stories, which would have meant a more complete answer to the question.

Time was the second most limiting factor in this project. Teachers, especially those who are using inquiry, seem to be very strapped for time and it was difficult to find
time to work with them. Had there been more time available for the project more in depth looks at the teachers and their classrooms would have been possible.

This project not only supplied several conclusions, but it also provoked a number of questions. One of the questions behind this project remains unanswered; why don’t more teachers use inquiry? A partial solution has come out; that in order for teachers to use inquiry they must have some philosophical commitment to it, but what is still unanswered is why some teachers have this commitment and others do not.

A second question that has arisen is: Are the criticisms of inquiry accurate? Mr. Kipp provided several criticism of inquiry including lack of academic challenge, a slow pace, and a lack of rigor. This project did not directly address any of these claims, yet it worthwhile to examine them to determine their validity.

A more practical question has also cropped up; what are specific strategies for inquiry? Since the focus of this project was to determine what extent inquiry could be implemented, there was little attention paid to the specific methods that teachers use to implement inquiry in their classrooms. From merely a cursory look at some of the literature there appears to be a myriad of practical implementations to use in the classroom.

Finally, a very important question has come up. All of the teachers that were surveyed and interviewed agreed that teaching inquiry is difficult and takes a lot of energy. This begs the question: are teachers who use inquiry able to sustain this type of teaching for an entire career? A worthwhile note is that all of the teachers that were interviewed are relatively young and have no children. Are these teachers going to be
able to maintain the class structure that they have now when they do have other commitments such as children.

All in all, this entire project has been very interesting. A number of questions regarding the use and implementation of inquiry have been answered, reassuring the researcher that inquiry can in fact be used, to some extent, in the science classroom of a Chicago Public School.
References


Felder, Richard M.; Brent, Rebecca. (1996). Navigating the Bumpy Road to Student-Centered Instruction. College Teaching, v44 n2 p43-47


Appendix

Data collection instruments

**Survey : Teachers Using Inquiry in the Chicago Public Schools**

1. To what extent do you use any student created/driven activities in your classroom?
   - Every Day
   - Most Days
   - Once or twice a week
   - Once or twice a month
   - Less than once a month
   - Never

2. Please list or briefly describe any student created/driven activities that take place in your classroom
   (Student designed labs, experiments, long-term projects, etc.)

   ______________________________________________________
   ______________________________________________________

3. Please list a few of the goals of your classroom

   ____________________________
   ____________________________

4. For the types of activities you use (or would like to use), your classrooms is
   - Well suited
   - Somewhat well suited
   - Not well suited

5. How often do you collaborate with other teachers?
   - Every Day
   - Most Days
   - Once or twice a week
   - Once or twice a month
   - Less than once a month
   - Never

6. Compared to other methods of instruction, planning for your class:

   (check 1 box per row)
   - Takes more time
   - Takes more energy
   - Is more difficult

<table>
<thead>
<tr>
<th>(check 1 box per row)</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neither agree or disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Takes more time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Takes more energy</td>
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<td></td>
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<tr>
<td>c. Is more difficult</td>
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</tr>
</tbody>
</table>
7. Compared to other classes at your school in the same subject, how much content do your classes cover in a year?

- [ ] Much more
- [ ] Slightly more
- [ ] About the same
- [ ] Slightly less
- [ ] Much less

8. When using inquiry, how much support do you receive from:

(check 1 box per row)

<table>
<thead>
<tr>
<th></th>
<th>Much support</th>
<th>Some support</th>
<th>Little support</th>
<th>Don’t know / Does not apply</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Administration</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>b. Peers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Parents</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Students</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

9. Do you experience struggles/challenges involving the following: (Check all that apply)

- [ ] a. commitment to textbooks
- [ ] b. commitment to curriculum
- [ ] c. difficulty creating of assessments
- [ ] d. teachers role in the class
- [ ] e. students role in the class
- [ ] f. parental resistance
- [ ] g. administrative resistance or conflict
- [ ] h. conflicts with other teachers
- [ ] i. lack of resources
- [ ] j. maturity level of the students
- [ ] k. unmotivated students
- [ ] l. students with insufficient skills (i.e. to collect and analyze data)
- [ ] m. students with little or no self-management skills
- [ ] Other ____________________________

10. Please leave any other relevant comments:
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
Interview Questions for Teachers

What I want to know:

As a science teacher do you use inquiry learning in your classroom?
If so to what extent? (all day every day, one activity a week/month/quarter)

What form does this inquiry take? (Projects? Self designed/guided labs/ other activities)

What are your goals when using these methods?

How successful are they generally? (Do you reach these goals)

What factors contribute to the success (or potential success) of this type of teaching?

What factors make difficult / inhibit this type of teaching?

What challenges is there for you, the teacher, with this type of teaching?
What challenges are there for the students with this type of teaching?

What good comes with this type of teaching for you, the teacher?
What good comes with this type of teaching for the students?

Do you find that you have enough time and energy?
What are the things that take up your time and energy?

Is your classrooms well suited for the types of activities you use?
Have you have to augment activities, projects, etc to fit the constraints of your room?

Do students have trouble adjusting to your class?
What parts and why?
Can all students learn this way?

Do you find that you have to sacrifice content to use inquiry?

Do you receive support from Peer / Administration in using inquiry?
Opposition?
Student Survey

Do you enjoy class?
_____ Yes         _____ No

Are you able to keep up with the class?
_____ Yes         _____ No

Is class interesting?
_____ Yes         _____ No

Is class hard?
_____ Yes         _____ No

Are you bored in class?
_____ Yes         _____ No

If given the option to go back to the beginning of the year would you retake this class?
_____ Yes         _____ No