What are effects of interdisciplinary teaching methods on student achievement?

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A project submitted to the faculty of

The Evergreen State College

In partial fulfillment of the requirements

For the degree

Master in Teaching

February 16, 2007

This project for Master in Teaching Degree

By

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Has been approved for

The Evergreen State College

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2007

Abstract

The following paper examines the research literature to answer the following questions: What are the effects of using interdisciplinary teaching methods on secondary level students? What are the challenges to implementation. The paper gives a general overview of relevancy, then a brief historical outline of the development of the ideas related to this interdisciplinary education. The next section is an examination of how effective these methods are in increasing student achievement as defined by test scores as well as more qualitative means. Finally, the paper highlights implications for further research and future practice such as the importance of staff collaboration and student teams.

Acknowledgments

I would like to acknowledge the help of a few people who made this paper possible.

First, I would like to thank Anita Lenges for her critique of my paper and conversation. Her guidance made this paper much better than it would have been otherwise.

Secondly, I would like to thank Mac Jones who took time out of his schedule to point me in the right direction when I was lost. His enthusiasm and knowledge helped me immensely.

Finally, I would like to thank my family and friends.

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CHAPTER ONE: INTRODUCTION

In recent years there have been a variety of people pointing to the field of education and saying that things are wrong. There are many explanations for these faults, ranging from the standards to the textbooks to the teachers themselves. One explanation that either gets overlooked, or perhaps people would rather not deal with, is that it is possible students are not interested enough to want to learn what is being taught in schools.

Introduction to Biology is a basic class that many students take, but what is that the students learn that they can take away from the class. English is regarded by most to be an important class but what if the students don't care about what they are writing; what if it does not connect to anything else in their lives. These same questions can be asked about most subjects.

The question that should be asked is: What if there were no subjects? What if classes were structured around concepts? Imagine instead of Biology, you had a class titled something like "What it means to be alive." This class could pull from Biology, naturally, but it could also include English, Philosophy, History, Art, even Math. You could study the basic scientific understandings of life but you could also trace the evolution of the ideas surrounding it and you could write about your experiences and feelings about your own life. You could create art about life and figure out equations about life expectancy and other ideas. In short, you could combine all the ideas that already exist within a school and use them together in conjunction to possibly create a much fuller, deeper understanding of something.

The basic question here is: How do we learn best? What is the setting that allows us to reach our highest capabilities? What is the best curricular structure for learning about something and engaging student interest? For years, the structure that is the traditional secondary school has been divided into subjects where little or no connection between them has been fostered. This has been a given, that you will go to school and have subjects.

What if this structure is not the best way to engage students in learning? That is the idea that I am going to be looking at within this paper. My specific question is: What are the effects on student learning of using interdisciplinary teaching approaches and what are the challenges to implementation in secondary classrooms?

This issue is of great importance to the academic world. The traditional structure of separate subjects has been around for years and there are presently plenty of students that are not being engaged. That is not to suggest that these two ideas are directly correlated, but is it not worth it to find out if there is a better way.

There are many arguments that can be made in favor of each side and I will attempt to provide some glimpses into those later. However the most important reason to see if interdisciplinary education can work is helping students make connections between various areas of life. Within the traditional structure of school connections are often ignored. Lines do not separate life; it exists in a messy mixture of everything. If we are going to live in a world that is not compartmentalized why should we study that way? When schooling does not look

like the real world there is a split between what is taught and what is retained. Dewey, in his book *Experience and Education* (1938), points out his problem:

One problem is …subject –matter…learned in isolation; it was put, as it were, in a watertight compartment. When the question is asked, then, what has become of it, where has it gone to, the right answer is that it is still there in the special compartment in which it was originally stowed away. If the exact same conditions recurred under which it was acquired, it would also recur and be available. But it was segregated when it was acquired and hence is so disconnected from the rest of experience that it is not available under the actual conditions of life. It is contrary to the laws of experience that learning of this kind, no matter how thoroughly engrained at the time, should give genuine preparation." (p. 48)

Dewey felt that education should resemble real life. This is a component of authentic learning that is extremely valuable for students.

Interdisciplinary Methods As Authentic, "Real" Learning

Connecting learning to the real world, specifically the real world that the student is living in, is a key to creating learning that lasts. Relevancy is one of the most important things that we can give students (Jacobs, 1991). Teaching across disciplines is one way in which to do that. Curriculum that works best for young people is imbedded in the lives that they are living, it is able to make connections to parts of their lives that are outside of the classroom (Beane, 1995). The fact that disregarding curriculum in general has not been a popular option in most traditional

schools has led some educators to integrating curriculum instead. Educators need to look for natural overlaps between subjects if they want to make interdisciplinary work (Jacobs, 1991).

The challenge of making education authentic and real is that schools often are not (Zemelman, Arthur, & Hyde, 2005). Schools are separated from the rest of the community. Schools need to be involved in communities and vice versa. They have been a separate place that creates vacuums of knowledge that does not find itself in the communities.

One of the specific ways that the authors suggest creating more connected curriculum is by creating curriculum that is based around student concerns and is broad enough to encompass multiple subjects These thematic units let students explore areas without having to stop at each subject division. This idea gives students more power to search things out for themselves and question. This idea excites many people but also could be frightening to others. Radnor (2004) thinks that it can be subversive. By giving students aspirations beyond what is in front of them the door is opened for students to question and doubt what has been told to them.

While some may see this as potentially dangerous because students are questioning their parents and teachers, it can also be seen as exciting and an invigorating goal for a teacher. These are the goals of teachers in democratic classrooms, one feature of which is student-driven interdisciplinary methods. These simply make it easier for students to make connections to other subjects and to their worlds. Integrating subjects can lead to more challenging, authentic learning (Bizar,

Daniels & Zemelman, 2001). By putting science into themes such as “What do we need to survive?” students have been able to cross subject borders and make the learning more interesting and pertinent to lives outside of school.

Challenges Of Implementation In High Schools

The main challenge of interdisciplinary education within traditionally separated curriculum is that the schools are placing walls around content. This is especially true in high school where subjects explicitly divide the classes. One side effect of this is that a substantial number of students feel isolated and disconnected from their peers (Bang, Brice, & Lamb, 1999). One of their conclusions is that the moving around throughout school leaves them little time to connect with their classmates or with content. One possible solution to this problem is integrating instruction, which provides opportunities for depth versus breadth and usually an increase in time with a group of students (Bizar, Daniels & Zemelman, 2001).

One challenge for high school teachers interested in teaching across disciplines is simply logistics. In most schools there are five to six periods a day with usually less than an hour for each class. This timing makes it difficult for teachers to integrate curriculum because there is only enough time to focus on what is needed to prepare for a test. This is why so many interdisciplinary classes are the products of block classes and team taught, according to Murata (2002). By combining classes and/or teachers the lines of subject division can become blurred and work can happen across those lines.

Another thing that can hamper teachers is the desire to teach everything in the curriculum. According to Daniels, Hyde and Zemelman (2005), some teachers,

and school districts are pushing for coverage of every possible item in an area. This can leave little time to explore where subject may cross over to provide greater depth.

Some solutions to this challenge have been teachers working together to independently create aligned curriculum between their classes or two classes organizationally working together on a linked topic, for example, American Studies using both American history and literature (Daniels, Hyde & Zemelman, 2005). The simplest solution is a single teacher working within their own class to combine various features under the banner of themes. For example, a history teacher could take the content that is supposed to be learned and break it up thematically instead of straight down a timeline. An example of how this could work would be a theme of civil rights. This thematic unit would include, obviously, history, but to truly understand the theme students should have exposure to literature, music, and art, among many other possible angles. These other subjects could seem like stretches but English, for example, can exist anywhere (Czajkowski, 1997). An obvious challenge to even the simplest form of these interdisciplinary methods would be a principal or school environment that is totally against it. Next, I will explore this and other challenges and controversies more in depth.

Controversies In Interdisciplinary Studies

As with any movement away from what is accepted, or has been the norm for years, there are challenges and controversies within this field. While proponents may feel that Interdisciplinary methods increase real life applicability,

student retention and interest level there are opponents who question those assertions. This next section will explore the debates within this field.

There are four major arguments that academics and researchers have against Interdisciplinary education. The first is that there simply is not enough academic research to suggest that this is as effective and proponents assert. Secondly, opponents believe that this can results in even more time taken away from other subjects such as music and art. In addition, opponents argue that there is as much if not more research for the benefits of disciplines than there is for interdisciplinary studies. Finally, critics point out that teachers aren't experienced enough with these concepts to be able to make it work.

While proponents of interdisciplinary education point towards certain research and findings, many critics suggest that there simply is not enough and that what is there is not very good. Some advocates of discipline-based education have suggested that current problems in schools will not be solved by curriculum integration and that those attempts have been falsely reported (Cross & Schug, 1998). Other critics suggest that in a rush to fix academic problems schools have adopted interdisciplinary methods because they are trendy and currently popular but that they do not have enough research to back them up (Brewer, 2002).

Some educators in areas that get less attention, for example the arts or physical education, see curriculum integration as a way to cut more time out of their subjects (Brewer, 2002). Art, specifically, has a tendency to be combined with other areas, Social Studies for example, to be part of a package. However, this combination takes away specific time away from the arts. Findings have shown that

the integration can have benefits for both subjects but that for art focusing exclusively on the medium can have "a more substantial and profound aesthetic experience (p.32)." Another argument from some art educators is that curriculum integration tends to combine all aspects of art into one, whereas there are many disciplines under the umbrella of 'art'. These art educators are advocating that in moving towards a new curriculum, they are not left behind.

This idea that interdisciplinary efforts actually reduce the amount of time that gets spent on certain subject is not limited to art. For example, the argument that some educators make is that in elementary school integration usually means that language arts get the most time with social studies and science getting less.

Another challenge is that teachers often do not have the level of expertise in various areas to make integration work (Cross & Schug, 2002). The knowledge level of each subject has to be much higher to be able to see connections to other disciplines.

Two of the main arguments of proponents are that the 'real-world' is not divided into subjects and that interdisciplinary studies encourage higher levels of thinking. Critics may agree on some levels with the former argument but also believe that it is much to widely used. The counter argument is that there are many jobs that are extremely specialized and develop from specific subjects.

Critics who say that in reality much of the integration exists on lower level thinking also call out the case that integration can lead to higher thinking. No one argues that schools are perfect or in no need of some kind of changes. Despite this,

opponents suggest that curriculum integration is not worth the effort (Cross & Schug, 2002). Opponents believe that the costs of curriculum integration are too high and the benefits are not worth it. They believe that teachers need to have too much training to make the integration work and school budgets are already strained. Overall, they have little confidence that curriculum integration is the way to go.

Other opponents of interdisciplinary restructuring argue that disciplines are powerful tools. Disciplines are not an arbitrary set of restrictions that keep us from seeing the whole picture. Instead, they are essential bodies of knowledge that provide the tools, vocabulary, and rigor required for participation in modern life (Gardner & Boix-Mansilla, 1994).

Another specific area in which opponents take issue with interdisciplinary methods is curriculum coverage. That is to say that many critics do not feel that these methods can allow students to get the entire curriculum that they need to make it. This thought comes from the idea that integrated, or thematic, instruction is not as inclusive of all information. In some ways, proponents would agree with this. One of the easiest problems for thematic units is to fill them with too much information (Daniels, Hyde & Zemelman, 2005).

While opponents may not argue against in-depth learning, many feel that there is a certain amount of topics that must be covered for a student to have a complete education. This idea is what had propelled books such as “What your First Grader Needs to Know” so popular. However, the idea that each student must learn certain things is not aligned with Daniels’, Hyde’s and Zemelman’s (2005)

theory. They write that each student can get different things out of schools and to push a certain thing onto each student is irresponsible.

Obviously, the debate over interdisciplinary methods has many facets and encompasses a wide area of educational theory. One thing that makes the argument more complicated is the various forms and terms that are used to describe interdisciplinary studies and its many cohorts. In the next section I will go through the definitions of the terms.

Definitions Of Terms

Making the discussion more complicated than simple theory is the fact that interdisciplinary study has many other names. In addition to other names there are plenty of other methods that are very similar. As I have already used in this paper integrated curriculum is equivalent and thematic units, or instruction, can often also be used interchangeably with integrated curriculum or interdisciplinary studies. Correlated curriculum is yet another like term, although it seems to be used much less. In addition, there are courses that link disciplines, in some cases without sharing space like my community college courses in Art and English.

It has been stated that there are essentially four types of Interdisciplinary teaching: Informed Disciplinarity, Synthetic interdisciplinarity, Transdisciplinarity, and Conceptual interdisciplinarity (Fath, Lattuca, & Voight, 2004). I will first define the roots of these words and theories and then give complete definitions for all these terms.

Discipline: According to Webster's dictionary, discipline is simply a field of study (1993). While this may in fact be a simple definition, it will work well for this paper and for the sake of clarity.

Integrate: Webster's defines this as a verb in the action of forming, coordinating, or blending into a functioning or unified whole. It also defines it as uniting with something else and incorporating into larger unit (1993). While not written especially for education, this definition works fine when inserting curriculum in as the noun upon which the verb is taking action on.

Inter: A prefix that means existing between, shared by, involving, or derived from two or more (1993).

Interdisciplinary Studies: Simply by putting together the above definitions we can derive that this is the study of, between, or shared by two or more fields study. This is an umbrella under which there are few derivations of which I will define shortly.

Integrated Curriculum: Again, by definition this is curriculum, or courses, blended together into a single unit. For example, a unit may integrate English and American History.

Four Types Of Interdisciplinary Studies

Informed Disciplinarity is a course that is taught under a single discipline but is aware of, and informed by, others (Lattuca, Fath, Voight, 2004). For example, Social Studies teacher may come across governmental interaction with the environment. It would be useful for this teacher to have some knowledge of ecology or something of the sort; this in fact might come into the teacher's lesson.

However, the class would not become a mixture of the ideas from a biology class, for example, and a Social Studies class. The science would inform the class but be a bystander.

Synthetic Interdisciplinarity is a course and instruction that link disciplines (2004). Taking the above example further could result in synthetic interdisciplinarity. For example, a class at the University of Chicago entitled "Introduction to Environmental Studies" integrates many aspects of social studies and sciences, as well as philosophy and others to study the essential questions of the course (2004).

Transdisciplinarity are courses and instruction that cross disciplines (2004). An example of this would be taking a single idea and testing it in multiple disciplines. For example, the question of what is freedom might be able to be asked in Language Arts, Social Studies, Science, Arts, and possibly Math. The focus would be the content and not the disciplines.

Conceptual Interdisciplinarity are courses and instruction without a compelling disciplinary basis (2004). This would be a course that studies the disciplines themselves and looks for critiques of how certain issue are presented. There is more of an emphasis on developing critical perspectives than on any particular disciplinary skills. An example of this might be a unit on gender roles.

Conclusion

The debate around interdisciplinary studies encompasses many views. The hope is that, as I stated at the start of this section, all the various proponents and opponents are working towards finding the best fit for students to get the most out

of them and provide them with the best opportunities for learning. In this section, I have explained why I wanted to look into this area, briefly outlined what people are saying about it and defined some of the major vocabulary of the area.

The question addressed in this paper is: What are the effects on student learning of using interdisciplinary teaching approaches in the classroom and what are the challenges in its implementation. The concepts I am looking at are not new, although they have not always been described in the same terms as they are now. In the next section I will explore how the theory and methods have changed over time and where they came from by looking at the history of the thoughts and theories behind interdisciplinary curriculum and where they have come to recently. The third chapter will be an examination of some of the research that has been done in this area and finally I will summarize all of my findings and present my conclusions in the fourth and final chapter.

CHAPTER TWO: HISTORY

Introduction

In the first chapter I laid out what interdisciplinary studies, or integrated curriculum, is. In this chapter I will look back at the past to see where the theories have come from and to see what interdisciplinary was.

There are two ways to look at the history of interdisciplinary studies: one would be to say that the style is a reform; another is to say that it is a return. The difference between the two is whether you look at school at the beginning as

divided into subjects or if you consider the beginnings of schooling to be before curricular division (Burton, 2001).

The current, and more popular, idea is to say that curriculum integration is a reform, a change. Schools in disciplinary blocks have been the norm for the life of high, and junior high, schools. A key realization is that even the name curriculum integration implies that it is a change from the norm, that integration is a step beyond the status quo (Malone, Rennie, Wallace, Vennie, 2002). Despite that, it is my opinion that at this time curriculum integration would best be considered a reform.

The Roots Of The Movement

Despite the historical prevalence of more traditional curricular structures roadblocks, and other challenges to implementation of any new structures, proponents of curriculum integration have been around for at least 100 years. The turn of the 20th century saw the one of the leaders of this movement, John Dewey, write about the need to diversify and authenticate learning opportunities (Hinde, 2005).

Dewey (1938, 1969) wrote that the "traditional scheme is, in essence, one of imposition from above and from outside. It imposes adult standards, subject matter, and methods upon those who are only growing slowly towards maturity. The gap is so great that the required subject-matter, the methods of learning and of behaving are so foreign to the existing capabilities of the young." This quote, along with others that I presented in chapter one and others not included, showcase the fact

that Dewey was, in fact, one of the original proponents of curriculum integration. However, he is not alone.

The ideas of curriculum integration have become fairly fashionable in the last quarter century. In fact, many proponents of the movement are annoyed at the lack of attention that is given to ideas previous to this generation (Beane, 1997). Some proponents suggest that the roots of the movement go beyond even Dewy to Rousseau (Beane, 1997). I believe that while this theory has some merit it is much too loose to present as the true start. I believe that the ideas presented by Dewey are in fact much closer to what we would think of interdisciplinary education currently.

Educators and reformers alike explored other options for organization. The organization of the curriculum should be organized around social problems to help find solutions, suggested Herbert Spencer in 1870 (Beane, 1997). Followers of Spencer thought that curriculum could be organized in themes for different students.

Despite other influences, I believe that Dewey was the major force in the evolution of the ideas behind curriculum integration. He also was not solely theoretical. For example, Dewey, in his Laboratory school in Chicago, organized curriculum around areas of human activity called occupations (Beane, 1997).

The key words such as integration and interdisciplinary were not being used to describe these thoughts around the turn of the century. Instead, correlation was a major key word for the times (Beane, 1997). In other works, there is more of mention of the goals and ideas related to curriculum integration. For example, William Kirkpatrick promoted learning that is organized around a problem or a

theme. The ideas of correlation and a variety of smaller offshoots continued until the 1920's when interdisciplinary education became a legitimate progressive movement (Beane, 1997).

In 1931, the National Education Association featured 19 different papers that related to integration in a variety of forms related to education and curriculum. In fact, that same year also had the same organization put out a paper entitled "Principles of Integration" which laid out more of the foundations. By 1936, the term integration had reached a point of familiarity that it had its own section in the Education Index (Beane, 1997).

In the 1940's the major piece of information was the Eight Year Study in which it was shown that graduates of high schools that experimented with curriculum organization did better than students from traditional high schools. Furthermore, the students from the six schools that featured curriculum integration did even better than the other students (Beane, 1997). This study is one of the most cited in the literature of interdisciplinary studies.

One of the major ideas to come from the Eight Year Study was of core programs in junior and senior high school. These program studied would combine certain subjects and make them classes that all students had to take, often with the same group of students and for more than one period. This was an initial stage of team teaching and block scheduling that has come to be associated with interdisciplinary studies. Integrated block style classes were found in almost 50% of the junior and senior high schools in the early to mid 1950's (Beane, 1997).

While the early to mid 1950's was the height of early integration it met its match when politics became further entrenched in the educational outlook thanks to McCarthyism, Sputnik and the increased role of technological education. Throughout the 1960's and 1970's integration died down to almost nothing, to the point that in 1974 the term integration was dropped from the Education index. However during that same time research and analysis on curriculum integration was being taking up to a greater degree in places like England (Beane, 1997).

Recent History

The last 20 years have been the most active for interdisciplinary studies. On one side, there have been many more schools and teachers experimenting with curriculum integration than previous times. On the other side there have been many critics suggesting that this is another reason for schools in the United States are lagging behind other countries in academic achievement. Many figures, such as former Secretary of Education William Bennet, have advocated for a core curriculum that needs to be learned by all students. While this shares some linguistic similarities to much of what was taking place in the 1950's, the designation from above and the resulting testing, such as the Washington Assessment of Student Learning exam, make it very different indeed. This is an extension, or maybe beginning, of the current state of high stakes testing to make sure that students are meeting certain requirements (Spring, 2006).

Despite this polarity, there is no doubt that there has been an increase in discussions surrounding these ideas. In looking at literature related to the integration of mathematics and science, for example, there has been a huge increase

in writings about this idea (Ahern, Czerniak, Sandmann, & Weber, 1999). From the first mention in the early 1900's of the science and mathematics being integrated in education there was a steady increase. In the time between 1991 and 2001, however, there were almost as many documents as the previous 90 years combined (Berlin & Lee, 2005) .The articles are broken down by their decades; in the 1900's there were two documents that related to math and science integration, in the 1910's there were none; in the 1920's back to two, then up to five in the 1930's. This pattern of small numbers continues until the 1960's where there are 29 documents, then the 1970's where there are 119. This is a good-sized number but it is nothing compared to the 389 in the 1990's alone. The authors projected that the 2000's would see approximately 490 (Berlin & Lee, 2005). The fact that this study is only related to math and science is offset by the fact that there is another study looking at the same ideas but related to all of curriculum integration that found very similar results. Gehrke (1998) found that the number of journal entries with the keywords of interdisciplinary curriculum went from 14 in the 1970's to 45 in 1990 to 1997. In addition, the keywords of curriculum integration went from 8 in the 1970's to 75 between 1990 and 1997. Finally, integrated curriculum as the keywords netted 494 journal listings in the 1970's and 778 between 1990 and 1997.

These studies do not mean that there has been this dramatic a rise in the actual implementation of integrated curriculum. In fact, the studies are very vague as to what exactly is being reported within these reports. However, it does point out that the conversation is increasing.

While these studies may show that the conversation is increasing the question of curriculum integration remains. Is this reform the correct way to continue? Are traditional structures best? At this point, little is for certain. One interesting note, that is usually brought up by opponents of integrated curriculum is that most of the research that has been done surrounding integrating curriculum has not research based and much has not studied long-term effects. In fact, of all the documents in the math and science study throughout the years there is only 44 that are considered research based (Berlin & Lee, 2005).

Conclusion

While Beane (1998) talks about current proponents of interdisciplinary curriculum 'standing on the shoulders of giants,' he seems to be only partially true. There is no doubt after reading Dewey that his ideas are some of the key foundations of this movement. However, it also seems true that despite attempts to align themselves with the Eight Year Study, and others, the history of curriculum integration is still fairly new. The majority of journal entries that I found were from the 1990's and even more recently, just like the research of Gehrke and others found.

This shows that the future of interdisciplinary curriculum is still very much in the air. It also suggests that more research is indeed in order, like many of the opponents suggest. Despite that, in the next chapter I will examine the research that I have found in this area. I will to summarize and critique the reports, ultimately leaving me with my conclusions about the current state of the research surrounding this area. After that, in the fourth and final chapter, I will complete this paper with

my overall conclusions and thoughts about the implications of this research and interdisciplinary curriculum in general.

CHAPTER THREE: LITERARY REVIEW

Introduction

In the first chapter of my paper I introduced the questions of what the effects of using an interdisciplinary curriculum on student learning and what challenges to implementation there are and I also explained why I thought it was important to look at for my career. In the second chapter I gave a brief overview of the history related to my questions. In this chapter, I will explore some of the research available that addresses my questions. As I have broken my topic into two questions, within this section I will do the same. The first section looks at the

results of a variety of types of interdisciplinary programs on a range of students and with a variety of strategies and what the perceptions of the students towards these programs are. This section will focus more specifically on students and what occurred within classes where an example of interdisciplinary education was being used. The second section will look at the various hurdles that I and anyone else in the education field will need to explore before implementation of these ideas. This section will focus primarily on perceptions from teachers and administrators in the difficulty in creating successful examples of these programs.

The field of research on my question includes very few studies that were general and large enough to apply across large populations. Because of that there are a number of studies that are focused on particular student groups or strategies. With this being the case it will be important to look at all of them as a whole to try and create a fuller picture.

As a review, there are two questions that I am looking at in this paper: What are the effects on students learning by using interdisciplinary methods? What are the roadblocks to implementation on a personal, and institutional, level?

Student Results And Perceptions

The first portion of studies are about student achievement and behavior results that have been found within the areas of student achievement in situations using integrated curriculum. First I will show are three studies that demonstrate a pattern of successful results from the integration of curriculum. After that I will showcase results from a variety of studies using some form of interdisciplinary

methods with different groups of students. Finally in this section I will show the variety of strategies that are being used and what those results have been.

I believe that this section of my paper is the most important and has the most opportunity to help me out in my future practice. To be able to implement any of the ideas regarding interdisciplinary education teachers should have a solid foundation of understanding about it. This section should begin the discussion and will ultimately bring up other areas that will need to be researched before teachers and administrators can suggest that they have a complete understanding of the affects of integrated curriculum.

The first study examined the academic and behavioral results of using an integrated curriculum on students. This study was not only focused on grades or test scores but also behavioral and attitudinal issues, as well (Cordogan & Stanciak, 2002).

The study was based on the research around a program developed in Shepard High School in Illinois. The school implemented a program that "substantively integrated English, mathematics, science, and social science courses" (p. 31). The study took in to account standardized test scores, attitudes and behavior issues measured by attendance, tardiness and suspensions. Racial and socio-economic data were not included. Despite that any initial differences in race and gender were controlled by thee-way ANOVA's.

For the method, students were randomly assigned into a group of one third of each of the freshman, sophomore and junior classes. These students were included in the integrated program while the other two-thirds of the students were

in regular classes and used as a comparison. The study looked at cumulative GPA for each year, days absent, times tardy, days suspended, percentage graduating, percentage taking the ACT, and ACT scores. In addition, the students took the Iowa Test at the start and end of their ninth grade years. All of this quantitative data was included with interviews of students and teachers participating in the interdisciplinary courses. An important note is that teachers volunteered to participate in this program.

The findings for this study were that beginning in the ninth grade with the Iowa test, students who were in the interdisciplinary program scored higher on standardized tests and were significantly demonstrating more positive academic behaviors as defined by attendance, graduation rates and suspensions.

The Iowa test scores were not expected to show significance between the groups because the test focused on skills that weren't at the heart of the interdisciplinary classes. However, after adjusting for initial variances in scores (none of which were statistically significant), the students in the interdisciplinary classes scored significantly higher on "interpreting literary material," "quantitative-advanced skills" and "quantitative thinking" (Cordogan & Stanciak, 2001, p.34). The study does not report if there were significant differences between the students in other areas of the test.

In addition, behavioral differences between the programs showed significantly more positive behaviors measured by fewer days absent or tardy and fewer suspensions. In all cases, there was significance above a .05 value in at least two of the years. The findings for GPA, graduation, and percentage taking the ACT

had similar results. The persistence in the Interdisciplinary program was 68.4 % compared to 23.8% in the traditional program. Finally, the differences between program persisters in each program were still significantly higher for those in the interdisciplinary program.

For purposes of generalizability, the largest problem that exists within this study is that it is of one school. This makes it harder to suggest that these results would be able to be replicated in other environments. In addition, the authors themselves suggest that the "novelty, extra attention and interaction among participating teachers could produce initial performance differences" (p.36). Finally, the teachers who participated in this program were volunteers so it is hard to factor what exactly each teacher brought to the classes. For example, the teachers who volunteered to teach these particular classes could be the most active and motivated teachers, so it would be possible that the students that they had, regardless of what methods were being used, would have the best results.

The implication of this study is that teaching across disciplines can have positive effects on both tangible test results and attitudes. However, there is not enough evidence to suggest that these results could be reproduced in any environment. In addition, there is not enough specificity regarding how exactly the classes were integrated to be able to try and replicate this study exactly.

The next study in this section similarly looked at the academic gains that could be attributed to a curriculum that was integrated. This study was written in response to a number of educators claiming that there was not enough research on the topic of integrated curriculum, despite the support of members of the education

community (Lewis & Shaha, 2003). The question that this study tried to answer was what is the effect on student achievement and attitudes from an integrated curriculum.

Participants in this study were 400 students and 15 teachers from nine high schools in English, Mathematics and Science courses. The study does not note where the students were from, what there genders were or what their racial or socio-economic background was. The aspects of this study that are important for my research question, in terms of student selection, are the sample size which is fairly large and the fact that the students are in high school, multiple high schools in fact.

Students were blindly split into three treatment groups. All survey responses were confidential. Teachers all agreed to take part in this program and in discussions surrounding their work. All assessments were done in a normal classroom setting at the start and end of the year. Teachers were assigned to instructional approaches based on personal preference. Attitudinal impact was gauged through a Likert scale survey and comparative impact was surveyed using Working, a tool similar to Likert. Finally, parents responded on a Likert survey. Examples of questions on the parental questionnaire were 1. Did your student's interest level in English improve this year?; and did your student talk positively about English this year?

For the English portion there were three models of classroom instruction from two high schools. Groups were matched for SES, GPA, age, and pre-test scores. Three groups were:

Traditional English, conducted as a stand-alone course. (n=91)

Applied English, added modules focusing on relevance and context and application for real world. (n=44)

Integrated English, integrated multi-course based around a shared context with a health profession course along with other science and health courses. (n=44)

For the Mathematics section there were six class groups from three high schools (two from each), matched as before. One class from each school in each:

Traditional Algebra, involving use of traditional text approach drill and practice being the primary means of reinforcement. (n=91)

Integrated mathematics, involving experientially designed examples that went beyond word problems to show application (n=93)

Measures were scored through computer administered assessment tool (ACT compass). Attitudes were measured through self-concept questionnaires.

For Science there were three different approaches involving 12 different groups matched as before.

Physics, stand alone stressing theories, computations and some lab (n=43)

Principles of Technology, including electronics and many principles taught theoretically or in labs with physics, but more as an applied non-scientific subject matter. (n=27)

Integrated Physics and Electronics, included course material covering the theoretical and lab content of physics along with applied material of electronics and principles of technology (n=42).

The overall results after a year of the study showed favorable finding that indicated the integrated curriculum was positive. The results show that, in this study, integrated curricula had higher attitudinal results as well as learning results in comparison to traditional curriculum approaches. The test scores were all at least equal to compartmentalized education, and in most cases were significantly higher. In addition, in the attitudinal surveys participants in the integrated classes reported at least equally positive attitudes towards the class and the teacher, in most cases significantly more positive.

In English, a pre-test established that there were no significant advantages between the groups. A post-test of attitudes showed significantly higher results in 11 of 14 items on a survey. Examples of the findings were a mean score of 4.15 in the interdisciplinary class compared to 3.70 in the traditional class on the statement “English is relevant to me and my future success.” Another example was a mean score of 3.75 in the interdisciplinary class compared to 3.34 in the traditional class on the statement “Rate your writing ability” (p.538).

In mathematics, results from both the pre and post-tests showed no significant differences in ability between the groups. However, the students in the integrated group reported significantly more positive results in attitudes and confidence towards math at the end of the year. The importance of this is that while student learning may not have been higher it was not lower as might be expected within mathematics and the student’s attitudes towards math were much higher afterwards.

Within science, no significant pre-test results were found between the groups. After a year the students in the integrated science class showed significantly higher scores than the other two classes and a significantly higher increase when comparing pre- and post test results. The objective post-test score results showed a mean of 29.24 for the students in the integrated class compared to 24.70 in the physics class, and 24.15 in the Principles of Technology. In a comparison of pre and post-test results, the mean difference was 8.45 for the integrated class compared to .58 for Physics and 1.67 for Principles of Technology. In addition, in an attitudinal study, students rated five of the six items significantly higher in the integrated class.

The strength of the study seems to be in the set-up. They worked very hard to divide the students equally and keep them anonymous. There seems to be a good congruence between the design and the findings. The combination of testing of ability and attitudes in separate formats seems to be effective way of measuring various effects of pedagogy. The applicability of this study may be limited because I think that there is very little information about what actually was going on in the courses over the year other than the small description. There seems to be plenty of room for variance among the methods and the teaching styles. It would have been more significant if there was more description of how specifically the students were taught. In addition, the lack of demographical information about the students makes it harder to assume that these results would work in other situations. The authors also admit that there is more research needed, specifically on different types of students. This is a theme that I found in a number of the studies.

While the first study showcased the results of one school testing to see if integrated curriculum would work for them and the second was of nine schools, the next looks at a much larger scale. In Los Angeles, Aschbacher (1991) studied a program that has become very popular and successful in the majority of the high schools in the district. Researchers wanted to find out how the students in the program had been affected in comparison with students that were not enrolled in it. The program is called Humanitas and it teaches the humanities in interdisciplinary teams and at the time of the study was in 29 of the 49 high schools in the district and just beginning in the middle schools. The classes were structured around English and Social studies with some art, philosophy, math, science, or other classes included for the ninth through eleventh graders and then usually world lit and government and economics for the twelfth graders. These courses were organized around central themes, which connect all the disciplines.

This program was evaluated against comparison classes of the same ages in similar socioeconomic areas. There was a performance-based assessment, a survey of students and staff, classroom observations, and analysis of teacher's assignments compared to the control classes and student work. In addition, there was analysis of school records such as attendance and discipline. Finally, as a control, standardized test scores were looked at.

The regression analyses of the student's work showed that students in the program had significantly been affected in writing and content knowledge. Performance continued to improve for students that were in the program for more than one year. Classroom observations showed that the students who were in the

Humanitas program spent more time in thoughtful conversation (6 minutes more per day) with more students participating (10 Humanitas students compared to 3).

In addition, attendance records showed that the studied group dropped out at a lower rate (11% to 15%) and came to class significantly more (86 % for first year Humanitas students compared with average and 94 % for students in their third year of the program).

Samples from surveys and classroom observations also suggested that while students in the program worked significantly harder they enjoyed their classes more.

One of the major successes of the program seems to have been motivating students who might be considered marginalized in some schools. “This program motivates students who would otherwise tune out,” (p. 19) said one teacher.

With results that appear to be very positive it is important to isolate possible reasons for success to see if they can be replicated. The numbers presented in the study show that students that were in this program were more successful on a variety of measurements than students in the comparison groups. The study gives no reason to question those results. However, can all of those results be attributed to interdisciplinary methods? The study points out that students partake in a number of activities that are diverse and entertaining. It also suggests that the students enjoy the program because it is challenging and prepares them for college. Finally, it suggests that there is a sense of community that is fostered within the program that supports the students. What the evidence does not obviously point to is a direct correlation between the achievements of the students and the

interdisciplinary nature of their program. It may be impossible to separate those two but I do not believe that the study makes it obvious that the reason for the success has been the teaching methods.

Another study was focused on how different teaching styles might affect achievement. The question specifically that the authors sought to answer was; what is the effect that using an integrated curriculum would have on motivation and strategy use in reading (Guthrie, Wigfield & VonSecker, 2000)?

The students in the study were taught in programs that centered on interdisciplinary themes such as environmental adaptation and weather. To compare another group of students was instructed in traditional methods. The students were in grades 3 and 5 and were from three schools in the mid-Atlantic region. The student populations were approximately 55% African American, 22% Caucasian, 15% Hispanic, and % Asian, or other. All of the teachers that participated were voluntary. In each of the grades, two classes used integrated curriculum and two used traditional curriculum structures.

Student motivation was measured using the Motivation for Reading Questionnaire (MSQ). The main areas that were looked at regarding intrinsic motivation were curiosity, involvement and preference for challenge. For extrinsic, they were recognition and competition. The authors used an HLM to examine their results.

The results showed that the students in the integrated classes had higher results for all the categories of motivation, intrinsic and extrinsic. However, the indicators of intrinsic motivation were much higher than the extrinsic in

comparison. The total mean from the third and fifth grades related to curiosity were 12.89 in the integrated classes and 10.59 in the traditional. Likewise, the total mean for involvement for in the integrated was 15.85 compared to 14.63 for traditional. Finally for the intrinsic indicators was a total mean of 19.22 for strategy use by the integrated classes and 17.24 for the traditional.

The findings by the authors from this study were that the students in the integrated curriculum had significantly higher curiosity about reading than the traditional students. Based on the presentation of the facts, their conclusions seem to be sound. However, the small number of participating students is a problem. In addition, with all of the teachers being volunteers there are questions that the motivation may also be coming from teachers who are invigorated by the new challenges that these classes provide. The data shows that there is a possibility that motivation of students can be increased using these methods. This idea, while not researched enough, has potential to be very important.

Other studies have also found that curricular integration can be positive. A report on schools in Title 1 classification questioned how effective any curricular innovations that were taking place in the schools were (Rubenstein & Wodatch, 2000).

The study chose nine middle schools as well as nine high schools to research. All of the schools met the requirements of being a title 1 school and attempting to input some new methods into the school. The schools ranged dramatically in demographics from 97% Hispanic to 95% white and from 1,990

students to only 125. The study does not include data to back up any of its suggestions but rather highlights a variety of schools and efforts at improvement.

Two strategies that were found to be very effective were interdisciplinary instruction and integration of vocational and academic content. “Integrating vocational and academic content enables students to make a connection between abstract academic studies and actual problems, tasks, and situations encountered in the workplace,” (p.19) stated the report.

The previous studies focused on general student populations and the effects that integrating curriculum had on them. Another area that has received study is the effect on particular groups of students. The next section of studies will focus on smaller groups to see the results of interdisciplinary methods on their achievement.

The first two studies are in line with the previous report that suggested integration of vocational and academic content could have success. The first of these studies sought to find out how effective a particular pilot program was at integrating vocational and academic content and what the student achievement results were (Logan & Tulloch, 1992). The study was centered on a pilot program that was aimed at increasing the reading, math and science scores of vocational students and increase their post-secondary educational opportunities. According to the authors, the program was at least partially because of the 1984 report *An Unfinished Agenda* which said that students, whether planning on going to college or not, should have a combination of vocational and traditional educational classes. The commission that wrote the report suggested incorporating material from each side into the other. This is what the pilot program attempted to do.

This study examined test scores from the pilot program and compared them to the year before the program started and also surveyed students and parents. The study began a baseline assessment in 1988 and then assessment in 1990 and 1993. This pilot program was selected to be studied more intensively out of six other sites in Kentucky that were making advancements in achievement. Key features of the program included integration of academic and vocational content and staff collaboration. The study used interviews, transcript studies and standardized assessments.

The school at which the pilot program was created was in rural western Kentucky and has 44% of its students on free or reduced lunch. The majority of the secondary students participate in vocational education to some degree.

When evaluating the effectiveness of the program the researchers compared the year before the program started to two years afterwards. They noted that the groups were very similar in most defining characteristics. The results were mostly positive. The reading scores went from a mean of 53.3 to 56.3, the science scores shot up from 270.1 to 285.2. However, the mean score for math went down from 298.9 to 296.8. Interestingly though, the mean score for black students increased 12.4 points in math while the white students scores dropped. The authors provide no possible explanation for this and I would suggest that it would make another interesting area to study.

On the surveys there was a significant increase in positive answers in the two years during the program. For example, the percentage of students that reported positively that the majority of the courses were challenging jumped from

63.6 in 1988 to 76.1 in 1990(58). In addition, the numbers for teachers relating material to the real world jumped from 73.6 to 91.0. Finally, encouragement to take more math and science classes jumped all the way from 47.3 in 1988 to 76.1 in 1990.

The authors themselves point out that only 67 students that fit the profile that they were looking to research. Because of this, they suggest that is would be very hard to generalize these results out to a national population. I agree with the author's assertions on that point. They suggest that the intention is to create hypotheses for further research.

Another study that was centered around a particular school that had positive changes looked at Polytech High School. The school went from being one of the worst schools to among the best (Southern Regional Educational Board, 2003). This study examined the reasons for such a major change. The reasons were plentiful but among them were the change from being a traditional academic school to one that was focused on vocational education, and the integration of the subjects from both of those areas.

In 1993, before the changes, the average reading score on the High Schools That Work Assessment was 252, in 2003 the score had shot up to 286, higher even than the goal of 279. For math, the scores went from 273 in 1993 to 303 in 2003, again higher than the goal, this time of 297. Finally, the average science score went from 283 in 1993 to 301 in 2003, higher than the foal goal of 299. In addition, over the last five years of the new program, average SAT scores increased by 30 points in the English portion and 23 in the Math. Combined with those numbers was an

increase in the number of students taking the test increasing from 36 to 48 %. The report failed to include additional findings such as the significance value.

Some of the features of the school that have been major changes are increased graduation requirements and separate academies for various vocational sections. However, one of the biggest changes was on overall integration of the academic subjects with the vocational subjects. This means that math was taught with an eye towards its applicability in real life vocational situations, for example.

These changes led to the use of academic content and skills at a much higher level than many other schools. For example, students at Polytech used science equipment in a lab at least weekly 69% of the time, compared to 28% from the average of other high scoring schools in the High Schools That Work network.

Like the last study that looked at a school that was already experiencing achievement gains through a new program this study shows that there have been major changes. What this study does not show emphatically is whether the changes are the results exclusively of integrating the vocational and academic content. From the evidence presented, it would not appear to be the case. However, the report does suggest, and the evidence seems to agree, that the integration of the two types of academic content can be a positive. Further research in determining the importance of that singular effort would be very helpful. The major critique of this study would be that it is not a study it is more of reporting of information

While the last two studies sought to take students that were on a vocational tract and strengthen their academics this next study looked at how one particular minority group faired within a program designed to improve mathematics scores.

The central idea that Henderson and Landesman (1995) studied was how students of Mexican descent were affected by thematically integrated mathematics instructions. The reason for the isolation in the study, according to the study, was because Hispanics are underachieving in school, specifically in math. The assumption behind the study was that by experiencing math problems integrated within real-life contexts, the students would be able to understand the material better.

The participants in the study were from a middle school with a majority of students of Mexican descent. The school had 90% population of Mexican descent, and of those 60% were of limited English. In the first year, 102 seventh grade students were randomly assigned to the integrated classes or traditional. The students in the traditional classes served as the comparison and kept to the same traditional schedule. The students that were in the themed, or integrated, group were then divided into one group that was exclusively taught in English and another that was taught bilingually. All of the students in the experimental group had math, reading, language arts, science and social studies together throughout the day. The second year the same basic system was set up. In total, after two years, 103 students participated in the experimental program. An important aspect in this study to acknowledge is that the students were dissolved from ability tracking.

To test the achievement of the students, there were pre- and post-tests created that were similar to the standardized tests that the school district used. Students were able to take the tests in either English or Spanish. Reliabilities were compared and the alpha coefficient for the computation tests ranged from .84 to

.86. The alpha coefficients for the concepts test ranged from .77 to .88. In addition, there was an attitudinal portion of the study that was based on a Likert-like scaled questionnaire.

The data from the two years was pooled and a MANOVA was used to determine if the treatment affected the subjects along more than one dimension and taking in the correlation of dependent variables. After the MANOVA, a series of ANCOVAs were implemented to cross check the results again. The analyses showed no treatment group differences between the years so the authors were comfortable pooling the results.

The responses from the personal responses showed that, equal to or higher than the national average, the students liked math, felt that they were good at it, thought math was easy and felt good about themselves when they solved math problems. These students also felt, again on a higher level then national averages, that math was about memorization and more about symbols than ideas. While these might not be considered positive attributes, the students also felt that it was just as important to know why an answer was right as it was to get it correct.

The achievement results of the students, however, were not as positive. There was improvement in each of the two years, yet the absolute level of achievement was low. The majority of the students had difficulty with concepts that should have been mastered in elementary school. Again, it is interesting to recall that these students had high perceptions of their math abilities. The authors were also surprised by the lack of change in some of the core values associated with math like the fact that they still thought math was just about memorizing.

The critique of this study would be that it actually did not show that the result of using an integrated curriculum was positive, or negative. It simply showed that the students improved a bit and that in general they had good attitudes. Specifically, the numbers for the test results were not included. The attitudinal gains were the primary focus of the study's report. In addition, the study had a lot of things going on with it. For one there was a language aspect. There were multiple divisions by language, which adds factors into consideration. In addition, there was the removal of the ability tracking. Just as in the last few studies, there are positive achievements demonstrated by the studies but too many factors to definitively declare that the reason for those achievements was the use of an integrated curriculum. Again, further research that was narrower in its scope would be helpful in making large assertions of the worthiness of interdisciplinary methods.

As with the last study, this next one looked at one particular cultural group and one particular subject area. The study was focused on populations that were under-represented, especially low-income, rural, females (Hough & St. Clair, 1994). The study examined the effectiveness of a program that was designed to get these students participation rates in science and math to increase.

The sample of students was 628 and the sample of teachers participating was 28. The teachers had been given extra training by Southwest Missouri State University in a consortium setting. Over this time, which lasted seven months, the staff created an integrated program titled PATTERNS. The

students were all in middle school. There were 246 sixth graders, 220 seventh graders, and 162 eighth graders.

The method for this study was a mix of qualitative and quantitative. For the qualitative, the researchers used interviews and observations from the classrooms. For the quantitative, they performed T-tests to determine the significance of pre- and post- test means and they performed a residual analysis of the pre-/post-test effects.

The responses to the survey were based around the goals set by the consortium. On a Likert scale of one through five, the mean score for the statement "The interdisciplinary approach used was beneficial to my students" was 4.36. In addition, the mean was 3.8 for the statement "The PATTERNS unit enabled me to integrate math and science with other areas of study." Finally, the statement "This project provided me with the opportunity to work with a team of teachers" had a mean score of 3.6. On all of the statements 0 was never and 5 was always.

In addition to the surveys, teachers wrote out additional comments about the benefits of the program. Some of those were: "High Interest Level," "Beneficial was working in teams," " Showing students how all subjects can relate to one specific subject and how important each subject is to the student," and many others.

The results from the students came from initially taking a field test of logical thinking to establish a base before the program. The pre- and post-tests were constructed by testing other students in comparable socio-economic brackets in the

area to find tests at an appropriate level. Once the tests were established, they served as pre- and post tests.

The mean effect from the T-scores between the two scores actually showed a -.52, with a 3.50 level of significance and a P value of .001. However, when looking at the sub-populations that showed a positive effect from the program the results were fairly large. The subpopulation that scored between 10-15 on the pre-test all had increases by the post-test. The significant effect gain scores were from students who had a pre-test mean of 14.38 and 13.32 respectively. There were 41 students in this sub-population.

In addition, the students also completed a questionnaire. Comments from this survey were very positive. The most common response from the students for suggestions for improvement was “No (suggestions), but I liked it!” with 75 responses. The second was “I just wish that we could have it longer than we did! It was great,” with 8 responses. Comparing the program with traditional instruction, the most common comment was “The PATTERNS unit was more fun,” with 18 responses. The second most popular, with 9 responses, was “I like having it tie in with all the subjects.”

Problems that I saw with this study were that the results from the pre- and post-test comparison showed that there was an overall negative effect yet there was a significantly positive effect from a sub-population. This would indicate that there were some students that did not increase achievement at all in this program. I would question why that is. This is another example from these studies that shows

certain groups, specifically minority, reacting in positive ways to these studies. This must be researched more.

In addition, the students all had to have a parent or guardian sign a permission slip allowing their participation and the teachers all trained for this. In other words, this was not simply comparing two things. This was taking a group of participants that knew that they were being viewed.

Much of the research that I have presented so far has been based around bringing students achievement and motivation up to quality levels. However, the effects of integrated curricula have been shown to be positive for a wide range of students, including those classified as gifted. Bai, Feng, O'Neill, Quek, and VanTassel-Baska (2005) examined those effects, along with perceptions of the stakeholders, in their study.

The authors studied a total of 973 students from one school district in the Northeast. The students ranged from third to fifth grade. For perceptions of the program, 367 parents, 110 educators, and 732 students took part in a questionnaire.

To examine results the authors used paired-sample t tests looking at the growth of students in language arts and science over six years. The results show that there were significant gains in literary analysis (Pre-test mean: 6.87, Post-test mean: 9.12), persuasive writing (Pre-test mean: 7.93, Post-test mean: 14.82), grammar (Pre-test mean: 12.09, Post-test mean: 21.67) and scientific research skills (Pre-test mean: 4.83, Post-test mean: 7.83). In addition, the authors looked at students that had prolonged exposure due to multiple years in the system. For those

students there was also significant growth in all areas, showing that the gains continued with prolonged exposure.

The vast majority of the teachers and parents felt that the curriculum was sufficiently challenging for both language arts (70%) and science (58%). Almost 92% of the parents expressed satisfaction with the program.

This study is effective in showing that these students using this method made these positive gains. However, the study is lacking anything that proves that these gains wouldn't have been made without this program. The authors note that since there is no control group there is little way to judge these results in comparison to non-integrated methods. The authors suggest that these results can be used because they can be compared against other numbers from previous cohort groupings, but they do not include any numbers to back that assertion up. The aspect that is positive is the length of the study and the responses from the stakeholders.

One of the major themes that was presented especially in the last few studies was that integrated curriculum is being looked for a variety of different groups. In addition, most of the studies focused on perceptions and attitudes towards these programs by stakeholders. This is a focus of the rest of the studies that I will include in this section.

One study that I looked examined how a new integrated program was received by the students that were participating in it. While it is focused on a university, I felt like there was some interesting applicability because of the time of

it (Kaplan, 1960). This study looked at the reception of an Interdisciplinary Social Sciences course at the University of Kentucky between 1947 and 1958.

This study was done in a simple survey format. The staff that taught classes in an interdisciplinary structure and the students who took those classes were given a number of statements to which they responded with agree, disagree or don't know. In addition, the staff and students were the opportunity to write comments stemming from cues.

The findings from this study showed that the cast majority of participants, both staff and students, felt that Interdisciplinary courses were a good idea. What is interesting to note is that while the participants were favorable in their comments towards the concept in general, they felt that this particular course needed modifications.

The biggest critique of this study is the sample size. While there appears to be a number of students over the 11 years that this program was being looked at, the number of participants who actually completed the survey was not reflective of that. This, in addition to the fact that many of the responses were summarized instead of verbatim, makes the applicability of this study fairly limited. In addition, the study takes places at a university that has advantages and challenges in the implementation of different curriculum that would be very different from a traditional high school.

An interesting area that is not usually looked at is how perceptions of students can possibly be judged fairly when they are aware of the fact that they are part of a test. The next report looked at that question (Smetherham, 1977).

Smetherham theorized that one of the major difficulties in getting students to really get into their classes is that they do not feel as though the material is all that important to them and moreover they don't feel that their teachers believe it either. With that, Smetherham believed that the integrated programs could bring some reality into the classes from both the student and the teacher perspective.

While the author did study the results of an integrated program, there are no numbers to back up his assertions. Rather the real reason that I wanted to include his report was to highlight the area of concern in reporting thoughts and feelings of students. One of the issues that Smetherham was especially aware of however was that when students feel as though they are being treated to an education that is not as real as something that they may know, they are less likely to be positive about it. The study that Smetherham conducted was in a school that was implementing an integrated science program in England. The major problem that many of the students had the first few years was that they felt as though they were part of an experiment.

While the last two studies had limited scope and importance, it is interesting to use as a frames for some of the ideas that continue to this day. The reason that I included it in this section as opposed to chapter two was to set up this next study. Unlike the last one, many of the studies that I have included have focused on the specific results that can be gauged in tests, for example. While I feel that is important, it is also important not to forget that any of these changes are for the students, so it is important to keep in mind the perceptions that they bring from these classes. I believe that this idea is related to the notion of collateral learning

that I previously noted from Dewey. This next study examined the effectiveness and student perceptions of an interdisciplinary program in Michigan (Bang, Brice, & Lamb, 1999).

The study focused around a program called the CLUB (Committed to Learning, Understanding, and Belonging), which was developed in part to create an environment where students felt more of a team and had more of a desire to continue on with school. The program was initially developed with special education and at-risk students.

This program took the team-teaching idea to another level as they created a group of students that were in the majority of classes together, from American Studies to the sciences. This study focused on student's perceptions about their connection to their classmates and also to the class materials. The students were interviewed in a focus group setting.

The results of these interviews were significantly positive towards the CLUB program. The students stated that they felt more comfortable, respected and challenged in the club program that in their regular classes. The CLUB students felt, in general, that they had more homework that was harder but that it was actually easier to complete because it was more interesting and related more to them.

The students also felt a much stronger sense of community in the CLUB classes, which they felt helped them in multiple ways. For one thing, students felt more comfortable, to the point that they would ask more questions. For another,

they felt like they had more chances to get to know each other so they made better friends and could trust each other more.

In addition, students felt that their teachers knew and cared more about them and that the symmetry between their classes helped from a workload perspective. One negative that developed, however was that students felt that having teachers that were always talking mean that their behavior in one class was always carried over into their other classes, sometimes to their detriment.

The researchers felt that the student perceptions met with the ideals of the program very nicely. There were some misconceptions of the program on both ends but the study suggests that both sides would like to continue it.

This study, while focused on student perceptions as opposed to strictly student achievement, comes under the same criticism that I have had for many of the other studies here in this section. That is there is too much going on to suggest emphatically that the reason for any positive outcomes is because of the use of an integrated curriculum.

So far in this section I have highlighted studies that have shown effects of interdisciplinary methods on a general level as well as on specific student populations. In addition, I just focused on student perceptions of these methods. I feel that all of those studies and areas are important for me to be aware as I am considering all this information for my career. The next group of studies is equally important. They focus on different strategies for integrating subjects and their results.

One area that has popularity in integration is art. While it is generally used in combination with English or History, this next study shows us that it can have positive results when combined with other subjects as well. Phillips and Bickley-Green (1998) studied the effectiveness of integrating art with mathematics instruction. This study was focused on fourth through eighth graders and the program's goal was to improve overall test scores.

For this study there were 30 art and math teachers that were given 60 hours of in-service training in interdisciplinary methods and procedures. There were a total of 146 students in eight classes. In the classes there was an average of 10.25 females, 8.38 males, 9 white students and 9 black students. For the study the students were given a pre-test on math knowledge. They were retested with the same test after the integrated lesson.

The results showed that in 81 of the 121 classes with art instruction there was significantly improved understanding of the mathematics. These numbers are compared to the control classes where only 29 of the 147 classes showed significant improvement. In comparison with other areas, the participating students scored higher than the county average in five of six ethnic categories.

The results for this study should be very encouraging to integrated curriculum advocates. However, it would be much better if the authors had included a few more details in their report. For example, it does not say how long the program actually lasted. This would help us determine how significant the amount of instruction these students got. In addition, I think that it might be helpful to be retested on another test. However, the inclusion of a control group is a

successful piece of the study. Another point that I think is important is the inclusion of data regarding results by minority students. As I have pointed out there have been some interesting results based around these students and it is important to have research that looks at these questions.

Most of the studies that I have looked at have examined integrating one subject with another, or one type of subject with another, like the last examples of integrating art. However, integration of academics can take many shapes. The next study examined the effects of using technology to help to teach students to write (Daniels, 2004). While that may not seem as though it is an obvious interdisciplinary effort, the ideas of writing and technology would generally be kept out of each other's classrooms in a traditional curricular structure.

The study was conducted with a series of 5th grade students in Michigan; data was collected primarily from interviews and standardized tests. The students that made up this study were from an "at-risk" school and only 16.7% of students had passed the fifth grade writing exams in 1998-99. The study was primarily looking at whether or not the use of computers was leading to better quality or quantity in writing. The study analyzed the scores from a standardized test in Michigan that was graded on a rubric with scores 1 through 4. In addition, the study interviewed instructors about their feelings teaching using the technology.

The study found that the numbers of students that were more excited about writing when done with a computer was high. The students were attracted to the computer instead of writing by hand. Some of the teacher comments illustrated how this simple integration created a situation where students felt like they were

working on more meaningful projects. Another interesting finding was that as students became more computer literate they focused more on the writing that they were doing. Daniels states that the improvement that was seen in the students cannot be solely attributed to an inclusion of computers. I believe his assertion and think that it is important to remember. One of the key things that I think can be taken from this was that the study showed that by teaching with flexibility there seemed to be academic growth.

The next study acted upon previous research that found that students who learned to read using literature more effectively than textbooks. The authors studied a group of fifth grade classes that were integrating history and reading instruction through literature. The classes were structured so that historical material was taught from the hook of the novel (Dobson, Monson, & Smith, 1992).

To evaluate this group of classes a control group was set up in neighboring schools of similar numbers and socioeconomic status. While the interdisciplinary classes integrated the curriculum, the control classes worked with Basal readers and social studies textbooks. All of the students were given a pre-assessment and post-assessment on free-recall thinking skills related to history and given score based on their answers.

The data suggested that the students in the interdisciplinary classes recalled approximately 60 % more information about the U.S. history topics that were covered than the control classes. At the start of the year the two groups had very similar recall scores (Control average = 7.01, project students = 6.70) however, by the end of the year the difference was quite significant (control = 11.4, project =

18.3). In all of the categories of analysis (mean number of details recalled by experimental vs. control, mean number of main ideas recalled by experimental vs. control, mean number of extended thoughts recalled by experimental vs. control, and mean number of total responses by experimental vs. control) the experimental group was significantly higher scoring.

In addition to quantitative data, the researchers survey the students using open-ended questions to evaluate their feelings about the classes. The responses to these questions suggested that the students were happier learning from the historical novels as opposed to the traditional basal readers and textbooks.

While this study was at the bottom end of the age grouping, the information that retention for one subject was strengthened by learning it alongside another subject is applicable to this conversation. The idea of using historical novels to teach history is easy ways to integrate literature and history, even in stand-alone classes. This study is of special importance to me as I will be teaching in a social studies environment that most likely will be a traditional subject-based classroom. While this study is with younger students, I believe that the author's findings show that this could work for any age.

While studies, like the last one, have shown that combining literature and another subject, specifically history, can have positive results in elementary and middle schools, it is important to note that studies of a similar variety have been conducted on a high school level. Bilof (1996) researched a class project that integrated fiction with history and the results were overwhelmingly positive.

The class studied aspects of the Civil war along with reading Shaara's *The Killer Angels*. There were numerous activities and lessons that built up ideas that came from the book but the basis of the student's information was the novel. While there was no control group, or quantifiable data, there were exit questionnaires that revealed an overwhelming approval of the method of learning this way. Out of 54 responses 52 endorsed the project. A large number of the positive were related to a depth of study that the students felt was because they had become more involved and interested in the people of the history.

While this study does not answer many questions, it does play off of the studies that show that this type of integration can be successful at other levels of schooling and suggests its applicability at the high school levels. As I have said earlier, there is not a huge amount of research that exists out there surrounding curriculum integration on the high school level. While I feel that it is acceptable to bring in research from other age levels, it is also important to make sure that there are examples of effective instruction at the high school level.

Although the focus of my paper has been on interdisciplinary methods, I always have an eye on social studies, the subject I am studying to teach. The next study that I am looking at is how effective the restructuring of the Social Studies Curriculum in New York City has been since a focus on integration was put in place (Crocco & Thornton, 2002). There was a particular focus on at-risk students.

The research is only for the one district of New York City, however there were over one million students attending school there at the time of this study. The study was based on questionnaires, interviews, observations, and documentary

research. The initial survey was tested by a board of administrators and refined and sent out to 193 high schools across the city. This study also focused much of its attention on the schools that were restructured to help at-risk students succeed. Examples of this restructuring are smaller schools and classes, and a focus on more constructivist teaching approaches. According to the survey, only 56% of the restructured schools follow the prescribed N.Y. state curriculum completely or partially. 68% of the teachers in these schools reported having a great deal of latitude in deviating from the prescribed course of study. This flexibility has led to a high degree of interdisciplinary classes within these schools.

The authors of the study suggest that the interdisciplinary classes were structured around themes, as is the case in most integrated programs. However, the authors suggest that this leads to teachers creating classes around pieces that they like to teach so that that there is little congruence between schools in terms of content. A good number of these restructured schools got waivers from the State from the high-stakes standardized testing that the majority of other students needed to take.

The study found that the teachers in these restructured schools were often beginning teachers with less experience (more than 35% of teachers in these schools has less than five years experience). In addition, the study found that within the integrated programs, many of the teachers were not qualified to teach their subjects. In only about 20 % of the restructured schools (the ones that were using interdisciplinary methods), were more than half of the social studies teachers certified in that field.

The authors concluded that these factors, combined with many others (including the lack of training in other assessment forms and in planning interdisciplinary lessons), mean that the students are getting short-changed. While the majority of respondents (73%) believe that interdisciplinary programs are going to increase in the future, the authors believe that more research and attention needs to be given to these before more schools go wholesale in that direction.

This study brings up some major issues that face anyone that is interested in creating schools that feature integrated curriculum. Opponents can question the lack of research, training, money and desire that is behind interdisciplinary education. This is the focus of the second part of this chapter. Specifically, I will look at the challenges that are out there for me if I were to try and bring an integrated curriculum into the school that I am going to be teaching about.

This last section showcased specific classroom studies that were focused on how student achievement and attitudes were affected by an integrated curriculum. The last grouping of studies showed examples of how the subjects could be combined. This next section will highlight challenges, besides those presented in the previous studies, to implementation of integrated curriculum.

Challenges To Implementation

While the last section showcased a variety of studies that focused on classroom achievement, I am also interested in what it would take to create changes on a larger scale. It is possible that I might want to, in my career, move into a leadership position. If that were the case I would need to know what the challenges

to implementing the ideas of integrated curriculum were, if I decided that it was worthwhile.

One of the ways in which it is confusing to discuss interdisciplinary education is the many different forms that it can take. These distinctions can be very important and each possibility can have their own pros and cons for teachers and administrators. One of the more popular seems to be team teaching, which this next study looks at.

While I have shown that integration can occur across almost any disciples, it appears that the majority of subjects that are integrated are in the humanities, and to a lesser degree the sciences. The schools that do incorporate interdisciplinary programs are most likely, in my research, to combine Social Studies and English. Murata (2002) performed a study of a high school to assess the results of combining social studies and English, along with Art on teacher efficacy and student achievement.

As in other studies, the classes in this school were organized around themes. For example, a junior year class combined U.S. History, Literature, and Art under the title “The American Experience.” Other examples of themes were “What does it mean to be Human?” and “The individual and the Society.”

To research the integrated classes Murata collected interviews, journals, observations and videotaped conversations from the teachers and surveys from the students. The students that were studied chose to enroll in the interdisciplinary program and there were three total classes one each at the sophomore, junior, and senior levels. The class sizes appear to be just below thirty in each class.

This study found that one of the most important influences on practice was mutual planning time. In fact, many of the teachers did not teach at the same time as might be expected for team-teaching. Rather, the shared planning periods allowed for the paired teachers to be on the same page with materials, themes, and workloads. The material that was being covered in single-discipline classes seemed to evolve into more conceptual matters that weren't bound by a single discipline. This was a feeling that was generated from teacher interviews but from student surveys the feelings seemed to be very similar. "[The] combined English- History class has no book/busy work. Everything that is studied/worked on has meaning," one student wrote. "I have never, ever learned so much in history or English. An amazing experience!"(p. 75).

Some things that the teachers hadn't planned on changed also because of the integrated nature of the classes. For example, the grading took much more of the process into account by having students create portfolios which contained work from all stages of the their process. In addition, the clear division of time seemed to disappear which resulted in spillover of teaching of one subject into another if the teacher felt that was important. The teachers also suggested that one of the most important aspects was that the groups felt a sense of community that was not present in normal separated classes. This sense of community was one of the greatest strengths of the program according to the staff, along with professional development.

The aspects of the last report that I think are important are details that could have taken some time to learn if just trying things out. For example, the fact that

teachers found common prep time to be more important that common teaching time is extremely useful. Another thought that was included in this study and others was the importance of community within the school.

As I have begun to show in some of the previous studies, there are many ways to make a program, interdisciplinary or not, successful. Oitsinger and Kallgren (2004), among others, argue that one of the best ways to make an interdisciplinary program work is by focusing on the students work together in peer teams. This continues the line of thinking that community is an important part of a school. Obviously, the stress that is being put on community raises the question of how it relates to curriculum integration. My answer to that would be that it appears that one of the outcomes of students spending more time together, as is often the case in an integrated program, is a heightened sense of community. After the last two studies have focused on community for teachers this next study examines how this can work for students.

The findings, from student interviews, course statistics and end of term assessments, showed that the program was increasingly successful each year and that the students participating in the program were pleased to do so. The authors suggest that the most influential aspect of development in collegiate undergraduate years is the peer group. That is why they feel that the peer teams can work so well for interdisciplinary teaching; the students can feed off of each other. This is also the reason that they feel it is very important to spend a great deal of time training the students how to act and work together in these groups.

In the fourth year of the program the retention rate was 77 percent, which was 24 percent higher than the campus average. In addition, on the Measure of Intellectual Development the students showed gains three times greater in cognition growth than their peers in regular classes.

While this study is limited in scope and is not in a high school, it does address one of the concerns often cited by opponents of interdisciplinary classes; the students don't know how to make the classes work for them. Oitsinger and Kallgren (2004) suggest that more time that they spent training the students on how to work in teams and outside of the normal areas of traditional disciplines is better. With the training students attested to the fact that they were learning, and excited about learning, more about concepts and investigating questions than particular isolated facts.

This sounds like a wonderful program and the goal of students working together is great one to have for any classroom. However, in trying to implement a program like this how can a teacher or administrator find more time to teach students how to learn in different ways and work together. Teachers already complain about not having enough time to teach everything that is needed.

The previous report brings up the issue that students might not be prepared to learn in an environment that is focused on an integrated curriculum. The next study looks at the issue of teachers not being prepared to teach in that style.

To see how teachers could learn this method more effectively it is important to look at a particular case. Banks and Stave (1998) examined the effects of collaboration of an education school's staff in order to teach future teachers how to

integrate curriculum. The authors feeling was that because interdisciplinary methods were so popular teachers should have some idea of what they were before getting into the field.

One of the major factors that they point out is that teaching together requires staff to work together. Place, interaction, and shared interests were the characteristics that they said would make a good team. To properly teach all of the ideas surrounding integrated curriculum, the school decided to model it. What resulted was basically an ethnography based on the students and teachers journal reflections.

The students reported that seeing the class taught in the style that they were learning about made it more interesting. One student said that working with others made him work harder. However, not all of the students enjoyed learning and working in this style. Some students said that it was too hard and that they would rather work by themselves. One student said that the toughest part was the interpersonal communication.

The journal entries showed a range of feelings and emotions that displayed how difficult it can be to learn how to teach this way. One student said that the assignment was a real pain and that it was stressful and upsetting. However, that same student also said they learned a lot from the experience. Many students expressed interest in the idea that each person was bringing something different to the table.

This study illustrates one of the most pressing issues for interdisciplinary teaching; that is, if much of this style comes within a team then all

the members need to be able to work together and should want to work together. In addition, it also illustrates just how important it is to train teachers to be able to work with other teachers.

While there are many examples of positive implementations of integrated programs there are still others where there is an obvious need for more training and leadership. Hackman and Shelley (2002) looked at the trends in instructional practices over the last few decades, pointing out the rise in faculty teaming and instructional integration. Their case study examined the effects on teacher's perceptions regarding integration of instruction and faculty teaming.

The researchers studied eight teachers who were part of an interdisciplinary team at a high school. The research was a mixture of data collection, interviews, observations of classes and meetings and student/parent surveys.

The school was located in the Midwest, was relatively small and overwhelmingly Caucasian. All of these factors separate this example from the majority of the ones presented in this paper. All of the freshmen class, except for those in independent special education classes, were part of these interdisciplinary programs. One of the main ideas behind this program was to create a smooth transition for freshmen entering the school. By the time of this study the program had been in effect for five years.

Interestingly, the findings of this study showed that the classes weren't being taught at integrated as they might have thought. The results showed that only 19.7 % of the school days were modified for interdisciplinary units. The major time that was spent on those units consisted of two major projects. Again interestingly,

the students surveyed did not seem to enjoy the work of the integrated curriculum but they did have positive things to say in general about the concept of the integrated curriculum.

The remainder of the study focused on disciplinary differences in teaching practices, which is interesting but not entirely in the scope of this paper. The portion of this study that I found particularly interesting was that the staff and students both were not experiencing high amounts of interdisciplinary curriculum, yet they still had positive reviews for it. At the same time, this study points out the need for training and leadership from above, which I highlighted earlier.

While the main question of this research is to determine whether or not interdisciplinary curriculum is positive for students there are some peripheral issues that can be cleared up as well. For example, what is the feeling of efficacy among teachers in an integrated program compared to a traditional one? While this seems on the surface to be slightly peripheral, in fact when a teacher feels more successful that is bound to eventually equal more success for the students. In addition, if I were to propose to other teachers that this style be adopted I should be aware of how it has been received by other teachers.

Payne and Warren (1997) studied a group of 82 8th grade teachers to see what their feelings were related to efficacy comparing curricular organization. One of the factors that should be noted immediately that this study compared teachers that were working in interdisciplinary teams and that had common planning periods with teachers in traditional models and interdisciplinary models without common planning time.

The study was conducted in twelve middle schools in two states in the southeast with four schools from each of the studied groups. An effort was made to select schools with as similar populations as possible. Teachers were surveyed using a scale to measure perceived efficacy and overall opinion. The results were assessed using an ANOVA.

The teachers that were involved in an interdisciplinary program, and had common planning time, had significantly higher personal efficacy rates (mean = 39.61 on teacher efficacy scale compared with 34.60 and 35.76) than the other two groups. However, the difference between the group of teachers in the interdisciplinary program without shared planning time and the traditional group was not significant. In addition, the two interdisciplinary groups had a significantly higher perception of homogeneity than the traditional group (m=18.39 & 15.72, compared with 14.79).

In total, the teachers in the group with common planning time had higher perceptions than the other two groups in managing student behavior, instructional coordination, cohesiveness, organizational rigidity, goal setting, decision-making, satisfaction/commitment, buffering, and collaboration. In addition, the teachers without common planning periods had higher perceptions in the majority of categories than the traditional teachers.

The previous reports in this section have highlighted many obstacles that I would face in the implementation of an integrated curriculum if I chose to take on the role of a school or district wide advocate. Among them are the lack of training for students and teachers and a restructuring of classrooms and teachers that would

be significant. The last study that I will look at show that the decisions for these curricular changes will not be made by teachers like myself until they reach higher up the administrational chain.

The study examined how principals rate the effectiveness of integrated curriculum models over a period of time. Arrendo and Rucinski (1998) looked at subjects are from 400 elementary, middle and high schools in the state of Missouri. They were chosen at random to represent a sample of the public and private schools in the state. This is the second phase of this research project. The first phase collected data about extent of integrated curriculum implementation. This phase was collected two years after the completion of the first phase. Phase two consisted of picking principals of schools that had used integrated curriculum for at least three years. Half reported high use, half reported low use. Questions aimed to find out about changes in use since initial data collection, strategies, planning and support of integrated curriculum. Interviews were conducted by phone, tape-recorded and transcribed. Principals rated questions on a Likert scale of 1 through 5.

The principals in this survey expressed strong beliefs in the effectiveness of improving learning of this strategy. Issue of time is the biggest problem in more wide spread implementation. Almost all of the principals expressed interest in increasing teacher's use of integrated curriculum. The only one that did not said that she supported the idea but that they still needed separate smaller classes. In general principals felt that more teacher collaboration is also needed and would help increase use of Integrated Curriculum.

The main problem with this study is the sample size. Out of the entire 400 schools they were only talking to 12 principals. This means that these results are so minimal that they cannot be taken as anything more than a small survey. The principals felt that the issue of time was a major one. This would seem to be a roadblock for implementation of almost any new program because of the amount of time it would take to plan and properly train staff. While I don't think that is an issue exclusive to integrated curriculum, it is obviously something that educators should be aware of.

This last study was loosely related to the effectiveness of an integrated curriculum. However, it was central to the second part of my question which is what are the challenges to implementation of an integrated curriculum? For me, as a potential advocate for interdisciplinary education, these are important for me to consider.

Conclusion

Within the last chapter I have laid out the research that I found on interdisciplinary education. As I stated at the start of the chapter there are areas that feel underrepresented by research. Throughout the course of this section I have pointed areas where additional research would be beneficial. Most importantly would be a large-scale study that looks at results from an integrated program over time, in comparison with a traditional program. In addition, I think that it would be beneficial to have some more research on how minority groups are affected by this type of instruction.

All of the research here will help me, as a future teacher and possible curriculum advocate, make decisions about how my classes will be run. In the next chapter, I will discuss further research implications as well as implications on my own practice.

CHAPTER FOUR: CONCLUSIONS AND IMPLICATIONS

Introduction

In the first chapter of this paper I laid out my reasoning for choosing the topic of interdisciplinary curriculum and my personal connections to the subject. Within that chapter I highlighted the fact that supporters (Beane, 1995/1997; Dewey, 1938; Daniels, Hyde, & Zemelman, 2005; Hayes-Jacobs, 2002) of interdisciplinary curriculum claim it provides a connection to real life that subject separated classes cannot. Opponents (Cross & Shug, 1998; Brewer, 2002; Boix-Mansilla, 1994) argue that there is not enough research that has proven the effectiveness of integrated curriculum and that discipline-based education is actually much more effective.

In the second chapter I gave a bit of background on the history of the movement specifically looking at Beane's (1997) work on the roots of the integrated curriculum movement. I also gave some more up-to-date statistics about the amount of research and thought that has been going into the topic in the last 20 years.

In the last chapter I laid out some of the studies that have been conducted on the different aspects and results of interdisciplinary curriculum. I showed that there was a variety of ways to make schools less dependent on curriculum separation and that there still was some need for research.

In this final chapter I am going to tie all of the previous work together and present my conclusions. I will draw implications of this research on my practice as a high school social studies teacher and further implications for research. I will also

point out what I have come to consider the strengths and weaknesses of both the ideas and the research behind interdisciplinary curriculum

Research Implications

With the range of studies that I presented in chapter three, it may be difficult to get a sense of closure on any argument surrounding interdisciplinary curriculum. I showcased the wide range of options and opportunities within the circle of interdisciplinary curriculum. The range, as I showed, goes from integrating vocational and academic subjects, to combining English and Social Studies, to integrating technology into the classroom as yet another tool.

The question that would need to be raised from the research is: is there enough research to state that integrating subjects into classes that have more of a focus on theme is a better thing? This is a pressing question and but unfortunately based on the research that I found there is no simple answer. For the Beane's, Vars', Hayes-Jacob's of the world there is more than enough research to justify more money and time being spent in this area. As I said earlier, there are estimates from proponents that there are around 80 studies that say that curriculum integration works. I certainly never found that many and opponents of these ideas question that number also (Cross & Shug, 1998). There were certainly more studies that included information that was exclusively in the domain of higher education but I don't know for sure whether those are included in Vars' count. This seems to be one of the major issues that surround integrated curriculum. For proponents, there is enough research and the evidence is clear that using these methods can

result in positive student achievement. For opponents, there simply is not enough research to make the changes in curriculum prudent.

Some questions that I think need to be answered are regarding the efficacy of this practice in a variety of situations. I think that there needs to be a closer look at how different backgrounds of students, and teachers, affect this practice. I also think that there needs to be a much stronger look at what kind of training teachers are going to need to be able to effectively teach in these methods. Even opponents, will say that the best integration comes when teachers know the materials well enough to find links. They say that that level of knowledge is not very common in the classroom (Cross & Shug, 1998).

If more training is going to be needed, where will money and time come from to make that happen. In an educational system that is already short on money it seems that spending additional money on something that is not foolproof is a risky move that I think many administrators would be careful to make.

Another area that needs to be examined more is if any subjects are getting shortchanged in these scenarios. For example, many proponents of subjects that might be considered fringe, like art, are feeling like their area is being cut out by curriculum integration. Brewer (2002) says that while some programs use art effectively others devalue art instruction within integrated programs. Math and Science educators have voiced similar concerns (Berlin & Lee, 2005).

When it comes to research exclusively, my findings were that there probably was not enough to justify an expensive transition to interdisciplinary curriculum on wide scales yet. However, I believe from the studies that I did find

that were positive (Aschbacher, 1991; Bang, Brice & Lamb, 1999; Beane, 1995/1997; Cordogan, 2001; Payne & Warren, 1997) that there is more than enough evidence to use these ideas in situations where they can be tested and used in smaller situations. In other words, if a few teachers asked me if they should combine their classes and focus on themes that connected them, if they had the chance, I would without question suggest that they do so. However, if a superintendent of a school district asked me if he should pay for the training of all his staff to facilitate a full-scale cross over to interdisciplinary curriculum, I would suggest that he take smaller steps.

Summary Of Research

When looking at the research of interdisciplinary curriculum, one theme that emerges is the idea of curriculum organization. This is the piece that separates it most from traditional discipline-based education. While this is a major feature, proponents have also suggested that there are other benefits and highlights.

One potential feature that has great importance that integrated curriculum may have over standard division is that it can be of opportunities for different types of learners (Ahern, Czerniak, Sandmann, Weber, 1999). It also has respect for diversity and culture, proponents suggest. I do not believe that I saw extensive evidence of this, however. Burton says that these approaches can be helpful in today's classes that are full of a diversity of backgrounds (2001). In addition, interdisciplinary curriculum tends to have a wider variety of assessments than traditional academic classes (Ahern, Czerniak, Sandmann, Weber, 1999).

Another area that I believe to be a strength of integrated curriculum is that it tends to be more student based. The benefits of an education that is more student centered can be creating self-directed independent thinkers or it could be keeping students from dropping out of school (Aschbacher, 1991).

My research has also shown that another benefit of integrated curriculum comes from the faculty. Especially in situations where teachers are working together on jointly taught classes, integration of subjects could be an exciting and enriching experience for educators (Murata, 2002). Aschbacher (1991) found that teachers were renewed by their experience and that while it was a lot of work it was nice to be in a nurturing environment that came from working with other staff.

Another benefit is similar but is related to the students. Interdisciplinary classes, especially those taught in team situations, tend to create community dynamics that are not as easily found in normal class situations (Ahern, Czerniak, Sandmann, Weber, 1999). This is especially important in situations where young people are feeling disconnected from their school and peers (Bang, Brice, Lamb, 1999). This sense of community can lead to students feeling comfortable enough to take risks which can lead to greater academic achievement (Cordogan, 2001). This sense of community and connection to school and peers can also be related to lower numbers of dropouts that Aschbacher (1991) mentioned.

Possibly the most significant advantage that interdisciplinary curriculum can have is that it has more integrity than regular subject divisions because it can address problems and solutions wherever they may lie (Ahern,

Czerniak, Sandmann, Weber, 1999). Beane (1995) thinks that this is the most important aspect of curriculum integration. I also believe that this can create students that are thinking on higher levels.

Having addressed the strengths of interdisciplinary curriculum, it is also important to point out that there are some weaknesses. The biggest complaint that I came across in my research was that there was not enough research to justify all of the commotion of these practices (Brewer, 2002; Cross & Shug, 1998). These authors simply feel that there have not been enough research-based studies have been conducted to turn this much attention over to this subject. As I have already stated, I tend to agree with these criticisms after my own review of the research.

The other major complaint that seems to arise is coverage. Opponents question whether all of subjects are getting enough attention and whether the sciences in particular might be getting shortchanged in an environment that calls for scientifically literate students (Ahern, Czerniak, Sandmann, Weber, 1999; Brewer, 2002; Cross & Shug, 1998). In our present times, and in any times for that matter, there is a strong need for individuals who posses specific skills. Opponents question whether or not integrating curriculum will cover those. For example, while people may interact in cross-curricular ways there is still a high need for specialization in our world. They cite specifically jobs in health care, human resources, law, engineering, and accounting as places where specificity is needed (Cross & Shug, 1998).

Cross and Shug also point out that there is a scarcity in educational funds, as I stated earlier in this chapter. They feel that the choice over which program gets

allocation should be determined by research. They are in favor of upgrading Advanced Placement classes or offering higher-level classes in other subjects.

Roadblocks To Implementation

Without focusing more energy on the lack of quality research surrounding interdisciplinary studies, there are still major roadblocks that will make implementation a challenge for many educators.

One of the most pressing and immediate challenges seems to be the current political environment surrounding high-stakes testing and standards-based education. This could lead to curriculum that is narrow in its focus and shortsighted in its goals (Caskey, 2002). With huge numbers of standards that are expected to be met and state-mandated testing of these standards, teachers often face choices of how to incorporate all the material that they need to get in and open student focused curriculum.

Another more subtle but equally pressing challenge, that I mentioned earlier, is that adults (read: parents, educational administrators, teachers) are generally reluctant to embrace that which they did not grow up with. As I stated in the history section, the history of this practice has roots but they are nowhere near as developed as the traditional subject break-downs.

As many of the interdisciplinary projects are broken down into teams (Murata, 2002), a challenge of logistics is simple to overlook and yet simply a very major problem.

How in a school day that is already pressed for time can staff that is working together get enough time to actually plan together? Drake (1993) states

that many teachers who attempt something like this find that it takes too much time. In addition to this challenge is the challenge of working in these teams. Hayes-Jacobs (2002) states that good teams are voluntary and that the planning from them requires good interpersonal skills.

All of participants in Murata's (2002) study stated that they would rather have time to plan curriculum together than even to teach together. Payne and Warren (1997) also reported similar findings. They felt that the connection to other lessons in the school was more important than even team teaching. Hayes Jacobs (2002) also agrees that there tends to be a huge amount of repetition in schools and the elimination of that can clear up space and create opportunities for connections. She recommends that teachers, as a first step, look for connections between what they are doing in each other's classes. All of these challenges are made even more difficult with the high amounts of staff turnover that many schools face (Drake, 1993). Every time that a staff person leaves or starts there is a need to catch that person up and that can leave staff feeling as if they are treading water.

Implications For My Teaching

In this section I have addressed the implications on future research in the field of interdisciplinary studies. Then I discussed my perceptions of the strengths and weaknesses of the arguments surrounding this idea. Finally, I laid out what I thought were the challenges to implementation that integrated curriculum faces, even withstanding the lack of critical research. In this final section, I will conclude how this research can affect my own teaching practice.

I plan on teaching social studies on the secondary level, meaning high school or middle school. The nature of social studies is already interdisciplinary to some degree in the combination of history, politics, psychology, and other subjects under one umbrella. My assumption, however, is that I will not be teaching in an environment that is set up to be overtly integrated within its curriculum. With that in mind, how will this research influence my teaching, specifically within the first few years when I will have little influence on curriculum?

The answer that I have come up with is that I plan on using pieces of the information and strategies that were outlined in chapter three for my classes. For example, I will not have the capabilities to teach much math or science in my classes like some of the studies (Cordigan & Stanciak, 2001; Lewis & Shaha, 2003). However, I could easily incorporate fictional stories into my historical teachings (Bilof, 1996; Dobson, Monson, & Smith, 1992). While that study was not the most involved, the conclusion that I got out of it was that adding historical fiction to a lesson could bring another level of awareness to the students. I have already tried activities like this in classes and have found them to be successful. In addition, I can and will incorporate art into my lessons as was shown in some of the studies (Murata, 2002; Mabry, 1997; Phillips & Bickley-Green, 1998). I believe that showing art of a particular era, for example, can help create a fuller picture of the time. I also think that there are connections that can be made within social studies to science, math, and just about any other subject.

All of the examples that I just gave are fairly simple. They will not need me to be an advocate for system-wide change. However, they are going to be

able to be implemented easily into my first year teaching. After that I can use the information from the studies in the challenges section to create wider changes if I think that they would be appropriate.

The bottom line for this paper is whether or not the research presented here is enough to make someone consider using interdisciplinary methods in their class. The answer for myself is that it is, to some degree. I believe that the studies that I presented show the possibility that exists within integrated curriculum. I also believe that there needs to be more and better research done. However, if all teachers waited for definitive research that had no chance of being a little bit wrong, where would we be? Probably, very close to where we are now. That is to say that there are a lot of teachers that have been teaching the exact same way for their whole careers and that is because that is how they were taught. I believe that there are more possibilities out there that can give students better chances at success. I believe that the research presented here shows that interdisciplinary methods could be one of those ways.

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