Summer March 2016

A Close Look at a STEM-Themed Magnet and its Experiential Program on the Occupational Identities, Career Maturity, and Access Provided to Low Socioeconomic Minority Students

Urlette Reyes
Loyola Marymount University

Summer July 2013

A Close Look at a STEM-Themed Magnet and its Experiential Program on the Occupational Identities, Career Maturity, and Access Provided to Low Socioeconomic Minority Students

Urlette Reyes
Loyola Marymount University, u.reyes@att.net

LOYOLA MARYMOUNT UNIVERSITY

A Close Look at a STEM-Themed Magnet and its Experiential Program on the Occupational Identities, Career Maturity, and Access Provided to Low Socioeconomic Minority Students

by

Urlette Reyes

A dissertation presented to the Faculty of the School of Education,

Loyola Marymount University,

in partial satisfaction of the requirements for the degree

Doctor of Education

2013

A Close Look at a STEM-Themed Magnet and its Experiential Program on the Occupational Identities, Career Maturity, and Access Provided to Low Socioeconomic Minority Students

by

Urlette Reyes

Loyola Marymount University
School of Education
Los Angeles, CA 90045

This dissertation written by Urlette Reyes, under the direction of the Dissertation Committee, is approved and accepted by all committee members, in partial fulfillment of requirements for the degree of Doctor of Education.

7/17/13
Date

Dissertation Committee

[redacted]
Karen Huchting, Ph.D., Committee Chair

[redacted]
Michael Gottfried, Ph.D., Committee Member

[redacted]
Elizabeth Reilly, Ed.D., Committee Member

ACKNOWLEDGEMENTS

This culminating work is the product of patience, persistence, resiliency and dedication, still with all of those attributes, success could not be achieved without a network of support. I must first acknowledge my chair and committee members:

Dr. Karen Huchting, my dissertation chair; to you my gratitude runs far and wide, your professionalism, tact and unending support has helped to carry me though and I am grateful beyond words or deeds.

Dr. Elizabeth Reilly, member of my dissertation committee; you have supported the development of this piece from its start through to the very end, I am grateful for all of your feedback, suggestions and support.

Dr. Michael Gottfried, member of my dissertation committee; for your insight and support I am grateful, you have been a wonderful addition to the LMU family.

Dr. Shane Martin, Dean of the LMU school of education; you are a dynamic leader and an example for us all. The work I produced under your tutelage opened doors even before I completed my degree and speak to the pertinence of the material covered.

To Charles Mason, you are a part of my foundation. Thank you for all that you do.

To Deanna Pittman, thank you for your patience, your support, and for extending yourself beyond your job description.

To Dr. J. Michelle Woods, my site leader and mentor, thank you for your unending guidance and support.

To the Jesuits of Loyola Marymount University, after earning two degrees at this

institution, you have created a lifelong fan of the Jesuit order. Nowhere else have I received such authentic education, I thank you for ensuring the quality of instructors, supporting individuals as well as choosing individuals who remain true to the Jesuit mission and standards. These things combined continue to rank the Jesuits as the best educators worldwide. I am honored to be a part of your legacy.

DEDICATION

This work is dedicated to Jahlyn and Ahmira Reyes-Mckinley. Thank you for sharing me, and allowing me to make this contribution to the body of knowledge that informs how we can make a difference in the lives of children. Know that all things are possible with hard work and dedication, we share in the responsibility of making the world a better place, and, I look forward to your contribution.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Figure Page

ABSTRACT

A Close Look at a STEM-Themed Magnet and its Experiential Program on the Occupational Identities, Career Maturity, and Access Provided to Low Socioeconomic Minority Students

by

Urlette Reyes

The purpose of this study was to determine the effects of an experiential program on the occupational identity, access, and career maturity of Black and Latino students from low socioeconomic backgrounds. Data shows these students to be underrepresented in STEM fields. Student interest and access are noted in the literature to be amongst the reasons minorities do not pursue a career in STEM related fields. Jobs within the STEM industry pay considerably more than non-STEM related jobs, access to these jobs can help individuals transform their socioeconomic status. Lack of access and exposure to these fields for low socioeconomic minorities then becomes a social justice issue. A mixed methods approach was applied which included surveys and interviews of junior students currently in an experiential careers program with a STEM emphasis. Composites and subscales were created and checked for internal reliability and consistency. Interview responses were recorded and coded based on theories of occupational identity and emergent themes. Findings suggest that most students within the experiential careers program exhibited high levels of occupational identity. The experiential

learning model works well to support continuous learning and the identity development of students from low socioeconomic backgrounds.

CHAPTER ONE

BACKGROUND OF STUDY

Despite the need for more capable individuals to enrich science, technology, engineering, and mathematics (STEM) fields in the United States, very little is being done to support the development of underrepresented minorities in these areas. (See Appendix C for List of Abbreviations). Low socioeconomic status (SES) children and adolescents, a group comprised largely of Black and Latino children, have limited access and exposure to these fields, primarily due to their limited social networks. This limited access impacts the occupational identity development and career maturity of low socioeconomic status children. Schools are a possible tool to provide access, exposing and cultivating interest for such underrepresented groups. This study will examine how participation in an experiential STEM curriculum influenced the state of occupational identity, access, and career maturity for Black and Latino high school students around STEM-related fields.

The State of the US in Science, Technology, Engineering, and Mathematics

A Declining Rank

The National Academy of Sciences is a council responsible for advising the US federal government on issues of science and technology. In 2005, it created a committee comprised of university presidents, professors, and industry leaders to conduct extensive analysis on the state of the US and its current trajectory in STEM. Their published report, *Rising above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*, is still the most extensive literature on the topic (National Research Council, 2007). The findings of this report and its stated and described directives will be discussed in the next two sections.

At the time this report was published (2007), the US ranked number one in economic competitiveness. This report cited the rankings from the International Institute for Management Development's (IMD) *World Competitiveness Yearbook*, as the basis for this statement (National Research Council, 2007). The IMD's *World Competitiveness Yearbook* compares the economic performance, government efficiency, business efficiency, and infrastructure of various nations. Using this information, a rank for each nation is constructed based on the afore mentioned factors. According to *Rising above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future* report, in 2005, the US was still the undisputed leader in basic and applied research within STEM fields.

That year (2005), the US had the top economic competiveness rank, with a score of 100, followed by Hong Kong, which scored 93. Canada, Finland, Denmark, Switzerland, Austria, Singapore, Iceland, and Luxembourg all came in third, with a score of 80 (National Research Council, 2007). Despite the 7-point lead on Hong Kong, the National Academies' Council expressed concern over the weakening of science and technology in the US. Though the US was in the lead, other countries were gaining steadily in their economic competiveness rank.

Today, according to the 2012 IMD *World Competitiveness Yearbook*, the US now trails behind Hong Kong, with a score of 97.7, its lowest indexed score in over 6 years. (see Table 1) Hong Kong is now ranked number one, with a score of 100, Switzerland can be found in third place, with a score of 96.6, and Singapore coming up quickly behind, with a score of 95.9 (IMD, 2012). Table 1 shows the US, after a stagnant period, started to decrease in its competiveness rankings, while competing nations were experiencing a gradual increase. What does this mean for STEM fields specifically and for the US economy as a whole? Factors that have contributed

to the US declining rank and possible future actions will be discussed in the next section.

Table 1

Competitiveness Index Scores

Year	United States	Hong Kong	Switzerland	Singapore
2012	97.75	100	96.679	95.923
2011	100	100	92.6	98.6
2009	100	98.146	94.163	95.74
2008	100	94.964	89.656	99.33
2007	100	93.541	90.432	99.121
2005	100	93	80	80

Declining Contributions in Research and Development

There are several ramifications of a declining competitiveness rank for the US economy. Although the rank itself has no direct financial or economic implications for the US, many contributing factors ultimately influence the economy. The current level of US investment in research and development (R&D) for STEM fields, the low number of US STEM graduates, and the current K–12 educational practices in STEM courses, for example, all compound to yield a decrease in competitiveness and a declining economy.

Along with its declining rank, the percentage of the United States' global contribution to science and engineering research and publications has declined (Rosser & Taylor, 2008). Whereas a global increase of almost 40% has occurred in contributions to the scientific body of knowledge through science and engineering publications from other nations, the US contribution to this same area has remained the same. In essence, the US is still making advancements in STEM innovations and publications, but nations outside of the US are experiencing growth in these areas at much higher rates, lessening US leadership, impact, and contribution to the global

science community (Hagedorn & Purnamasari, 2012; National Research Council, 2007; Rosser & Taylor, 2008).

The US has gone from a 27.4 billion dollar "high-tech trade surplus in 1990" (Rosser & Taylor, 2008, p. 20) to a 134.6 billion dollar "trade deficit in 2005" (p. 20). Other nations have adopted the innovation model that made the US successful in previous years. That is, these nations have placed a high priority on research because of its economic and social value. The social value of research lies in its ability to create a higher standard of living and a better quality of life (Bevins, 2012; National Research Council, 2007) for its citizens. The European Union specifically set out to make support for research and development 3% of its gross domestic product (GDP) by 2010. This is just 0.3% more than where the US was in 2000—almost a decade earlier (National Research Council, 2007). According to the most recent data obtained from the World Bank (http://databank.worldbank.org), by 2008 other competing nations such as Korea, Singapore, and Switzerland successfully made research and development approximately 3% of their GDP, thereby matching the status of the US, which had operated at approximately 3% for over a decade even in light of the declining economy.

Once a leader of patents and inventions, responsible for creating many everyday comforts such as the Internet, broadband, and cellular phones (Rosser & Taylor, 2008), the US is now being quickly surpassed by other nations (Hagedorn & Purnamasari, 2012) in the use and advancement of these technologies. The global focus on science and technology has negatively impacted US revenue in manufacturing and technology services, but has led to a rise in revenue for other nations. India, an example of one such nation, has experienced a rapid rise in revenue from software services, going from 0 in 1993 to 10 billion dollars in 2002 (National Research

Council, 2007). Ireland, Israel, Finland, Taiwan, and South Korea—just to name a few—have also have been successful in their technological advances (Rosser & Taylor, 2008). Spain is now Europe's leader in green energy, with a focus on solar and wind technologies (Rosser & Taylor, 2008). China has become "the world's biggest exporter of telecom equipment, computers, electronic components and even solar panels" (p. 21). What can be done to propel the US trajectory of science and technology development? Perhaps cultivating more citizens to enter and stay in STEM fields will help the US maintain its position as a global leader in STEM and other related fields.

STEM Degrees in the US

The number and quality of STEM degrees attained in the US is a problem that has led to decreasing global competitiveness and an altered trajectory of productivity. Retention and attrition of individuals who pursue STEM degrees, gatekeeper practices, curriculum, and pedagogical practices have added to the problem. Even for the most successful individuals, the aforementioned issues often result in individuals being unprepared to support STEM R&D or innovation in industry, which would help boost our lagging economy.

The United States Bureau of Labor Statistics has predicted that Science and Medical related fields will be on the rise and in high demand in the future (Bureau of Labor Statistics, 2010). Despite a rising undergraduate population, 2005 had fewer students pursuing a degree in science and engineering than the nation had seen 20 years earlier (Chang, Eagan, Lin, & Hurtado 2011; Rosser & Taylor, 2008). At the time, less than half of freshman undergraduates chose to attempt science and engineering degrees (National Research Council, 2007). Studies have shown that few US students, particularly students of low socioeconomic status are choosing STEM

majors or careers (Chang et al., 2011; Hagedorn & Purnamasari, 2012; Reid, 2008). Other studies indicate that there has been *some* improvement in the overall number of individuals enrolling in STEM-related majors, but retention of those students has been one of the obstacles to increasing the number of STEM graduates in the United States (Hagedorn & Purnamasari, 2012; Whalen & Shelley, 2010). Few students are found to switch into STEM-related fields, resulting in a continued decline for the undergraduate STEM population over time (Hagedorn & Purnamasari, 2012).

Introductory gatekeeper classes have functioned to promote the best academic students and weed out highly qualified students who could succeed if given the proper support (National Research Council, 2007). The literature indicates that the students often impacted by these gatekeeper practices are disproportionally women and students of color. These gatekeeper practices—combined with issues of curriculum, pedagogy, and varied levels of student preparation—continue to contribute to the stagnant, if not decreasing, numbers of US STEM graduates (National Research Council, 2007; Whalen & Shelley, 2010).

Often, school curriculum and pedagogy yield individuals who are inadequately prepared to work outside of academia and contribute to industry (Guzdail, 2011; Hagedorn & Purnamasari, 2012; National Research Council, 2007). The traits (teaching methodologies, educational practices, and systems) of educational institutions as well as the background characteristics of students (prior knowledge, access to a rigorous curriculum, and outside opportunities/exposure) are key areas that determine an individual's success as a STEM major (Hagedorn & Purnamasari, 2012; Whalen & Shelley, 2010). Thomas and Wingert's (2010) article, cautioned that improving the US's pace in the "global economic race" is going to require

more than increasing minority enrollment, but supporting their successful preparation and graduation as well.

Successful preparation of low SES students will require additional academic and financial support to make up for the skills that may be lacking from their K–12 education. With the current funding cuts to the K–12 system and cuts to state and university support funding for students, supporting the development of low SES minority students will become increasingly harder. With this lack of funding, low SES students will continue to be underprepared, and a limited number of individuals will be able to afford higher education. As we grapple with these issues, international numbers of STEM degrees continue to rise. In 2008, for example, China was producing twice as many engineers as the US (Rosser & Taylor, 2008).

Many organizations within education, government, and industry are attempting to address the issues of low enrollment and degree attainment that plague STEM-related fields. The coalition for Tapping America's Potential (also known as TAP) is an example of one such organization, who is committed to analyzing the shortcomings that have led the US to its current state. The TAP coalition has outlined five key measures for increasing STEM graduation levels: (a) make US STEM performance a national priority; (b) improve math and science education; (c) inspire American youth to study and enter these fields with a special effort to involve underrepresented groups; (d) reform immigration policies to recruit and retain highly educated foreign talent; (e) increase funding for basic research especially in the physical sciences and engineering. What does this information mean for K–12 education and beyond? In focusing on the objectives outlined above, perhaps changes in what we teach and how we teach are necessary to better cultivate interest and ability for an untapped segment of our population—low SES

students.

K–12 STEM Education

Reform of STEM education in the K–12 arena is needed. Changes in curriculum and pedagogy to better cultivate skills and student interest could change the contribution of minority students to STEM-related fields. A curriculum that is relevant, not just to the lives of students but also to the needs of society, should be considered. Supplemental funding through partnerships and effective use of technology are tools that K-12 education should consider and develop to advance students who are capable of contributing to the STEM pipeline through more than just consumerism, but also degree attainment and innovation.

US students were almost last in rankings compared to other nations on the 1999 Trends in International Mathematics and Science study (TIMS) (National Research Council, 2007). This study is conducted every four years and compares the performance of students from various nations in math and science. The National Research Council (2007) attributed the low performance of US students to "inadequate quality teaching and a weak curriculum" (p. 95).

The latest TIMS results (see Figure 1) show 4th-graders from Hong Kong and Singapore leading the way in math and science performance, and middle school students from Singapore and Korea are setting the bar with their math and science scores (see Figure 2). US scores have flat-lined, experiencing nominal increases for the past 12 years. K–12 education in the US is mirroring the stall in performance and growth seen in the field of STEM research and publication. Meanwhile, European nations are experiencing upward growth in their K–12 math and science scores (National Center for Education Statistics, 2007), or producing scores that are flat-lining at equivalent, if not higher, levels when compared to the US. If we are to increase our

"talent pool" (National Research Council, 2007, p. 112) of qualified scientist, engineers, and STEM researchers, we must improve K–12 math and science education (Guzdial, 2011; National Research Council, 2007). It may be necessary to take a look at what we teach and how we teach it. The current curriculum and pedagogy of science education is neither inviting students to be a part of the scientific community nor inspiring them toward innovation to solve problems plaguing our society (National Research Council, 2007).

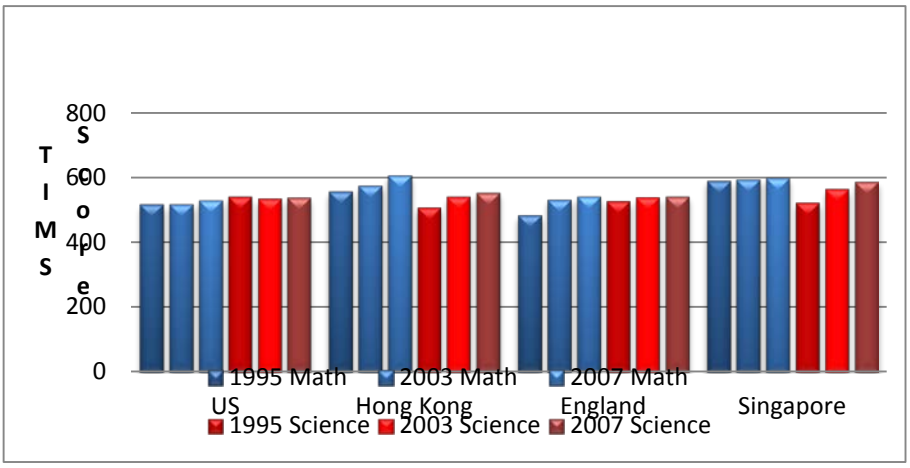

Figure 1. Trends in 4th-grade international math and science scores.
This graph illustrates the 4th-grade math and science performance levels as indicated by the Trends in International Mathematics and Science Study (TIMS) for top performing and gaining nations for the past 12 years. Data obtained from http://nces.ed.gov

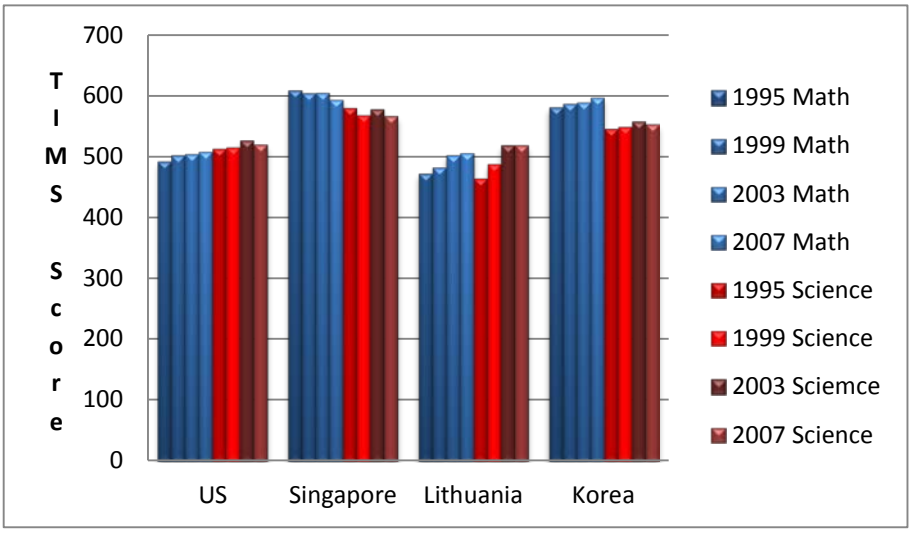

Figure 2.Trends in 8th-grade international math and science scores.
This graph illustrates the 8th-grade Trends in International Mathematics and Science (TIMS) scores for top performing and gaining nations for the past 12 years. Data obtained from http://nces.ed.gov.

Public funding for science research, engineering research, and graduate education has been central to the strength of the US innovation in the past (National Research Council, 2007). With public funding and support becoming increasingly dismal, we must find new ways to support the work of teaching innovation in K–12. With the incorporation of labs and activities—many of which include consumables that need to be repurchased consistently—it is crucial to acknowledge that matriculating students who are well prepared with scientific skills and knowledge can be a costly task.

Though intended as advice for colleges and universities, Rosser and Taylor's (2008) recommendation of "connecting industry with academia to disseminate best practices and increase ties" (p. 24) is one that the public K–12 system can benefit from and one that will

contribute to a stronger undergraduate STEM pool, thus leading to a stronger group of individuals in STEM research and development. Companies like AMGEN, which supports a biotech program for teachers and students, and Raytheon, which sponsors engineering games for middle and high school students, are already leading the way as examples. These companies help provide consumables (AMGEN) and experiences (Raytheon) that supplement education in ways that the current system has been unable to support due to the cost involved.

Funding has been just one of the issues that have negatively impacted the education path to successful degree attainment within the STEM fields. Lack of interest, motivation, knowledge, and skills, developed through the K–12 experience of students continues to be an issue for STEM development (National Research Council, 2007). Focusing on creating a relevant curriculum that is inclusive of the social benefits (like a higher quality of living and a better quality of life), the application of scientific concepts, and the effective incorporation of technology (Hagedorn & Purnamasari, 2012; Rosser & Taylor, 2008) might be the direction that leads to increased interest for STEM fields.

Science pedagogy has historically been on the rote side of teaching and learning. The push toward inquiry has not been fully developed or supported by budget cuts. Indeed, K–12 education and even undergraduate education have failed to produce the type of problem-solvers that will support and advance graduate research and innovation (National Research Council, 2007).

Bevins (2012) has explained that education “must be dynamic” and “adapt to changes in technology” (p. 10) if we are going to produce a competitive and efficient workforce. The lives of many students are “surrounded by technology,” which they use for “multiple forms of

entertainment" (Bevins, 2012, p. 11). We must support students in shifting from simply consumers of science and technology products to innovative producers of them. In our attempts, we must acknowledge that students will have varied levels of exposure to modern science and technology. This exposure can be extremely varied as quality products tend to come with a price-tag not affordable for all students (Hagedorn & Purnamasari, 2012). Who are these students, and how do we prepare for the degree of variance in exposure and preparation for students in STEM fields?

Minority Presence in STEM Fields and Careers

More than Lack of Ability

Lack of minority presence involves much more than lack of ability. Poor K–12 preparation that lacks both rigor (Constantine Erickson, Banks, & Timberlake 1998; Hagedorn & Purnamasari, 2012; Ndura Robinson, & Ochs, 2003; Solorzano & Ornelas, 2004; Whalen & Shelly, 2010) and high-quality teachers (Hagedorn & Purnamasari, 2012; National Research Council, 2007) are common K–12 issues in the education of minorities. Lack of interest (Grimmett, 2006; National Research Council, 2007; Reid, 2008), access, and exposure (Constantine et al, 1998; Fouad & Byars-Winston, 2005; Grimmett, 2006), fed by societal stereotypes (Fouad & Byars-Winston, 2005), and lack of role models (Constantine et al., 1998), are some systemic factors that limit minorities in pursuing STEM fields. As such, minority students are an untapped resource in this area.

Poor K–12 Preparation

Not all Americans have access to a quality education. Success in STEM-related fields often requires levels of rigor not provided in minority communities, especially where

achievement gaps are most pronounced. Students with a low socioeconomic status, “are much more likely to experience poor quality schooling” (Hagedorn & Purnamasari, 2012, p. 148). Schools in such communities often have limited or no access to AP courses (Hagedorn & Purnamasari, 2012; Ndura et.al, 2003; Solorzano & Ornelas, 2004; Whalen & Shelly, 2010) and have less prepared teachers (Hagedorn & Purnamasari, 2012). African American and Latino students are disproportionally represented in AP courses in schools where they are offered (Constantine et al., 1998; Hagedorn & Purnamasari, 2012), even when those schools are in low-income communities (Solorzano & Ornelas, 2004). “One third of all AP courses are in STEM disciplines” (Hagedorn & Purnamasari, 2012, p. 151). Lack of access to the rigor of AP courses has serious implications for creating a college-going STEM community for minorities within low-income areas. This situation is supported by the findings of Ndura et al. (2003), which have shown—reversely—that a positive relationship exists between parents who hold professional careers and have incomes that fall within the higher socioeconomic bracket and students enrolled in AP classes.

Levels of scientific and technological literacy are often low or poorly developed within low socioeconomic communities, limiting the ability of these individuals to participate effectively in a society “increasingly shaped by science and technology” (National Research Council, 2007, p. 112). Not only are individuals from low-income households less likely to own or use high-quality technology products, but they are also less likely to be exposed to them in an educational setting, as schools within those communities are less likely to have them as well (Hagedorn & Purnamasari, 2012).

Systemic Issues of Access and Exposure

How does one create minority interest for an industry (i.e., STEM fields) that is unknown to students while countering socially embedded perceptions of what minorities are able to do? Implied societal "expectations about who should perform what types of work" (Fouad & Byars-Winston, 2005, p. 223) ultimately create barriers in career choices for minority students. Some careers are perceived as unattainable (Constantine et al., 1998; Fouad & Byars-Winston, 2005), and others are simply unknown to minorities because they exist outside of their community sphere. One cannot pursue a career he or she has never heard of—or for which the necessary skills and abilities needed to obtain a particular career are unknown (Hagedorn & Purnamasari, 2012).

Exposure to STEM fields that have low minority representation may be one of the keys to creating interest for minority students. But creating that exposure is a complex task layered with obstacles of its own. The first obstacle is the lack of role models that look like students in low SES communities (Constantine et al., 1998). The current underrepresentation of minorities in STEM fields provides a very limited pool of role models that look like students of color.

Another obstacle lies in the family and community spheres for low SES students. Some researchers argue that the career interests and aspirations of minorities are equivalent to that of their Caucasian counterparts, but actual or perceived barriers impede them from fulfilling their aspirations (Constantine et al., 1998; Fouad & Byars-Winston, 2005). Community spheres and societal influence are factors that contribute to occupational aspirations of all youth (Adragna, 2009; Malanchuk Messersmith, & Eccles, 2010). That minorities are not proportionally represented in all fields (Fouad & Byars-Winston, 2005) indicates some sort obstacle to the

attainment of aspirations. Yet other researchers have noted that early career interest for minorities often revolve around the fields of athletics, entertainment, or law enforcement (Grimmett, 2006). Individuals within these careers may be more commonplace within low socioeconomic communities (Constantine et al., 1998) or fall into the implied societal expectations of what individuals within their ethnic group are able to do (Fouad & Byars-Winston, 2005).

Lack of individuals within the family sphere or community who are employed within STEM-related fields limits the possibility of exposure to STEM careers through that network (Constantine et al., 1998; Fouad & Byars-Winston, 2005; Grimmett, 2006). Identity theory (Erikson, 1968, 1985; Marcia, 2002) and the development of occupational identities (Adragna, 2009; Malanchuk et al., 2010; Meeus, 1993) speak to the influence of family and community as influences on the development of identity during preadolescence (Fouad & Byars-Winston, 2005). Familial and community influences provide implied career possibilities for children to explore. The ramifications of existing, perceived, and carried out stereotypical influences, issues of access and exposure, and how they contribute to the perpetuation of poverty for low SES students have yet to be fully researched or explored within the literature (Constantine et al, 1998).

An Untapped Resource

US minorities that are Black, Latino, of low SES status, or any combination thereof are an untapped resource that can contribute to STEM fields. According to the 2010 US census data, minorities made up approximately 25% of the population. A large number of the Black and Latino minorities are concentrated in homogeneous low-income schools across California and

within the Los Angeles Unified School District (Solorzano & Ornelas, 2004). Lack of access and exposure to the type of education and curriculum that can support minorities in successfully attaining STEM degrees and careers reproduces an inequitable system and "denies both the mainstream and minorities" a chance to transform society (Ndura, Robinson, & Ochs, 2003, p. 33). Human capital is necessary to keep the US competitive in the global STEM economy, thus preparing minorities to support the STEM infrastructure at all levels would be beneficial to the individuals and society as a whole (Ndura et al., 2003). What can be done on the secondary level to support Black and Latino low-income minorities in contributing to the competitiveness of the US in STEM-related fields? Increasing their interest and motivation to pursue STEM careers, and finding innovative methods of teaching and learning may be the answer to tapping into Black and Latino minorities as a resource for STEM-related fields.

Introduction to the Study: The Role American Schools Must Play

Of the five key reform measures outlined by the TAP coalition (mentioned earlier), two deal directly with the issues facing minority students: (a) motivating students to enter science-related fields; and (b) improving math and science education in the K–12 arena (Reid, 2008). Schools are places where students have the opportunity to interact with the world outside of their community and family spheres in a constructive way. Experiential methods of teaching and learning have the potential to provide access and exposure to STEM fields for low SES students. The curriculum to foster interest in STEM fields should be relevant, sound, and rigorous to provide students the proper background for success, as noted by Whalen and Shelley (2010). The school environment and leadership to cultivate such interest must be one open to explore nontraditional ways of teaching students of color, using education as a tool to address

inequalities for our low SES minority students.

Faculty must acknowledge—and attempt to counter—the issues that come with the lack of access, exposure, and role models who look like the students themselves in professions where minorities are underrepresented (i.e., STEM-related fields). Stereotypic perceptions that encourage minority students to pursue fields like athletics and entertainment often imposed on and held by minorities, can create hurdles to accessing other professions (Constantine et al., 1998; Fouad & Byars-Winston, 2005; Grimmett, 2006). These hurdles are reinforced by a lack of role models within STEM fields and an abundance of role models in the athletic and entertainment fields. School programs must systematically deconstruct these stereotypes and perceptions in order to begin developing minority interest in underrepresented areas. Are there any programs in place that have worked to support the development of minority students? Can these programs be modified to increase their efficiency in developing Black and other minority students? A look at magnet schools may lead to possibilities for all schools servicing Black and Latino youth.

Magnet Schools

Themed magnet schools are a place where minority students are gaining exposure to underrepresented fields and are receiving a curriculum rigorous enough to give them a chance in their postsecondary pursuits. Magnet schools are an example of an alternative education system that is working to cultivate student interest, increase student motivation, and provide a rigorous high-quality education for America's children around an established theme.

There are currently three models of magnet programs in place throughout the nation. The "dedicated magnet" model is the rarest type—this is where everyone in the school has chosen the

program, and all students are a part of the magnet. Students must fill out an application to be considered, and applications are only available once a year. There are only 20 such schools within the Los Angeles Unified School District. The second is the most popular and exists as a program within a school; often referred to as “a school within a school.” Only students who apply to be a part of the magnet participate in this program, and these schools often run on a separate budget within the school. There are 141 of these magnets housed on various campuses throughout the district. The third is termed a “whole school attendance zone” magnet, where all students are part of the magnet but the school is a neighborhood school (Rossell, 2005). These neighborhood school magnet programs, although present in other areas of the nation, do not exist within the Los Angeles area.

Numerous themed magnets have been established to address STEM-related fields. In light of the measures outlined by the TAP coalition, and the needs of our nation as depicted by the National Research Council, these magnets can aid in increasing STEM graduation levels as they motivate students toward the STEM pipeline and improve the rigor and success of students in K–12 math and science education.

Initially a tool of desegregation, magnet schools were designed to draw students away from affluent White schools to other areas of the city where they would contribute to establishing a diverse student body population (Rossell, 2005). To do this, magnet schools were created around a special focus, be it science, math, arts, careers, or a college preparatory curriculum. The variety provided parents and students with choice. These institutions, in a sense, have been given permission to explore nontraditional ways of instruction so as not to perpetuate academic deficiencies. Within a unified school district, magnet schools continue to contribute to the

decrease in the achievement gap and to the cultivation of minority student interest in non-stereotypical pursuits.

Purpose of the Study

How can education create minority interest for an industry (i.e., STEM fields) that exists outside the socioeconomic spheres of low-income students, has few minority representatives, and goes against social stereotypes of minority ability? The curriculum and pedagogy used by various thematic magnets to encourage students toward degrees in science, technology, engineering, and math (STEM) fields have yet to be examined or documented in the literature. As a result, the possibility of doing any comparative analysis about which method works best does not exist.

This study will look at the implementation of curriculum and pedagogy used by Archard Medical Magnet High School, a STEM-themed school in Los Angeles, to support and cultivate students toward its STEM theme. The experiential program, academic program, and its efforts to create an environment that engage students in nontraditional ways and provide them access and exposure to STEM fields where minorities are underrepresented will be examined.

The site chosen for this study belongs to the rare category of “dedicated magnet.” All students at the site filled out an application to attend the school, participate in its programs, and—upon acceptance—are classified as magnet students. This magnet is a themed STEM magnet that emphasizes medicine- and science-related careers with a Hospital Careers Program that makes use of an experiential curriculum.

Archard Medical Magnet High School uses its hospital careers program—which has an experiential-based curriculum and pedagogy—to give students access and exposure to STEM

fields in its medicine and science careers program. This program exposes students to professionals in STEM fields. Students shadow, train, and work with professionals as an apprentice for one semester or one year. Participation in the Hospital Careers Program is an option for juniors within the magnet. These students must be recommended for the program by a member of the faculty, have a 2.5 minimum GPA, good attendance, and no unsatisfactory marks ("U"s) in cooperation or work habits. Accepted students take a skills survey and submit a site request based on their area of interest or survey results. Based on student skills and interest, students are matched as closely as possible with a site based on site availability.

The purpose of this study was to take a close look at the effects of participating in an experiential curriculum on student occupational identity, access to STEM-related career information through self-advocacy, and the career maturity level of low SES minority students. This study was a descriptive study that examined the experiences of students currently participating in the Hospital Careers Program.

Significance of the Study

The effectiveness of an experiential curriculum in increasing exposure and access to areas where minorities are underrepresented will inform leaders of the effects of such curriculum to develop the occupational identities of students of color and, hopefully, give more leaders permission to explore rigorous nontraditional ways of cultivating students of color. This study will document one example of the current pedagogical and curricular methodologies in place at a thematic magnet school and contribute to the gap in the literature on the occupational identity development and career maturity of low SES students in underrepresented fields. The ability to develop a functional occupational identity, one grounded in the abilities and interests of students,

has the potential to transform the socioeconomic status of low SES students and allow them to have a greater impact on their immediate and global community.

Theoretical Framework

Students of color are often deficient in the development of their occupational identities. Media images support and cultivate minority aspirations toward athletic and entertainment careers (Grimmett, 2006; Noguera, 2008). Minority representatives in other areas, such as academia, medicine, science, engineering, and other professional fields, are rare. Apprenticeships for such fields become next to impossible for students of color due to the lack of role models (Constantine et al., 1998) and poor academic preparation (Hagedorn & Purnamasari, 2012; National Research Council, 2007).

A whole capable segment of society is left untouched by current socially embedded perceptions and lack of support and access for minority students within these fields. The combined effect of limiting social structures and lack of support creates an underdeveloped occupational identity for minority students. The development of occupational identity starts in the middle school years (Constantine et al., 1998; Malanchuk et al., 2010). For low socioeconomic status students, this phase of adolescent identity begins without sufficient access and exposure to fields where minorities are underrepresented. To redress this situation, it is exigent that high schools within low-income communities conduct education in a way that grants this exposure. How, then, do we go about fostering these identities and providing access for students of color in these underrepresented fields? The proper implementation of an experiential curriculum just might be the answer. This study will incorporate occupational identity theory (Adragna, 2009; Malanchuk et al., 2010; Meeus, 1993) and experiential learning theory (Kolb &

Kolb, 2009), and will discuss how the two come together in the social justice theory of access (Brighouse, 2004; North, 2006; Rawls, 2001).

Research Questions

This study was designed to address the following questions:

1. What are the experiences of students within the Hospital Careers Program, an experiential curriculum, at Archard Medical Magnet High School?
    1.1 What are the strengths and weaknesses associated with the experiential program through the eyes of the students?
3. Does the academic curriculum outside of the careers program support the development of students?
4. What is the state of occupational identity, access through self-advocacy, and career maturity for low SES Black and Latino students who are participating in the hospital careers experiential curriculum at Archard Medical Magnet High School?

To answer these research questions, students' level of identity development as it relates to occupation was measured. Their level of access, operationally defined and measured by their level of self-advocacy to the resources available, was also determined. Crites's Career Maturity Inventory (CMI) (1995) was used to measure their level of career maturity. Lastly, curricular experiences, outside of the experiential Hospital Careers Program, were assessed to determine if students are being exposed to a curriculum rigorous enough to contribute to their postsecondary success.

Research Design and Methodology

This study employed a mixed-method approach that implemented a questionnaire to

obtain quantitative and qualitative responses from students, as well as utilized student interview data to obtain an in-depth look at the general state of student occupational identity. This quantitative and qualitative model allowed for the triangulation of data collected concurrently during the study (Gay, Mills, & Airasian, 2009). In other words, the survey provided mostly quantitative data to measure the dependent variables of occupational identity, access, and career maturity. Meanwhile, selected student interviews provided qualitative data on these variables in addition to their perceptions of the strengths and weaknesses of the experiential program. Although the survey was implemented first—with qualitative interviews following—the data provided by both forms of measurement concurrently represent the views of junior students enrolled in the program and, as such, will answer all research questions.

Specifically, this study surveyed 59 junior students currently participating in the program. Five of those students were randomly selected and interviewed for an in-depth sense of student occupational identities, interest in STEM careers, reasons for their career choice, and the effect of the experiential Hospital Careers Program on their decision. Participants were also asked to respond to survey questions about their past experiences and future goals to aid in determining their present state of occupational identity development and any outside factors that may have had an influence on their development. Taken together, the survey and interview data provide a rich examination of the students' experiences in the careers program. This study is the first to capture the students' voices and experiences and will greatly contribute to recommendations for the administration on how to improve the program. Likewise, findings will suggest whether students in the program have a strong occupational identity, career maturity, and access to STEM-related information, further indicating areas of strength or improvement for the school

administration to consider.

Limitations

I am a part of the teaching and learning community at this site, and I believe in its mission and vision to support student interest and development in STEM fields. I do not work within the experiential Hospital Careers Program, but I interact with students enrolled in the program through my assignment. My positionality is one that seeks the best method of supporting our students toward our school's mission. As such, my personal bias is a belief in the experiential teaching and learning method implemented in this program, which seeks to increase interest in STEM fields and developing functional occupational identities for low socioeconomic Black and Latino students. To balance my preconceived beliefs, however, quantitative surveys measuring students' occupational identities and career maturity will provide data to triangulate the student interview data, which then will be coded to identify the strengths and weaknesses of the program.

Additionally, the program places students in internship positions for a variety of STEM-related fields and are exposed to a variety of people, positions, and contexts. Controlling the quality of the internship is beyond the scope of the researcher and, to some degree, beyond the program's control. Although the school attempts to place students with professionals, various sites, and role models, there is still a range in activities that a student may be exposed to in the program. Knowledge of systems in place to counter that variation or streamline student experiences towards the positive is not available because no research has been done on the strategies or methodologies of medical magnet high schools. As such, responses by students may reflect the variations of internship programs rather than the program as a whole. Still, these

perspectives would be valuable for the school administration when considering programmatic improvements.

Delimitations

Delimitations are used to expose the limits of a study. Primarily, the scope of this study is the effects of the experiential curriculum on occupational identity development, access through self-advocacy, and level of career maturity for low SES Black and Latino minority students. The demographic focus limits the overall generalizability of the study; however, for purposes of this study, which seeks to examine the effects of an experiential curriculum specifically for students of color, the school site selection is appropriate to address the research questions posed and the interests of the researcher.

The scope of this study is also limited to the careers program at one magnet school in California. There are other medical magnet high schools throughout California. Each of the medical magnet high schools are partnered with different universities and medical facilities, and have students placed in various departments within those sites. As such, any student in a medical careers program in California will be exposed to the same level of variation in their experiences as the students in this study. But data gathered here will only reflect the experiences of the students in this particular program.

Finally, the relationship between the experiential curriculum and the actual number of students that pursue STEM-related jobs even at an entry level, STEM degrees, or STEM-related careers would further provide evidence for the effectiveness of such a curriculum but would require a longitudinal study and is thus outside the scope of what this study aims to demonstrate.

Summary and Organization of the Study

This study addresses the social justice issue of access and exposure to STEM fields for low socioeconomic status minority students, the effectiveness of an experiential curriculum, and its potential for providing access and increasing the interest of underrepresented minorities in STEM-related fields. Chapter Two looks at the various aspects of identity development as described by Erikson (1968, 1985) and occupational identity development specifically as an extension of this work. Experiential learning theory, its value as an instructional methodology, and its role in creating exposure and access within schools will also be examined. Chapter Three will detail the proposed methodology and variables of this study. Chapter Four will illustrate the data and findings collected. Finally, in Chapter Five, the concluding chapter, will discuss the findings and future implications.

CHAPTER TWO

LITERATURE REVIEW

Children from low socioeconomic communities are disadvantaged in their access to STEM-related fields and opportunities to develop functional occupational identities (Astramovich & Harris, 2007; Kenny, Blustein, Chaves, Grossman & Gallagher, 2003). This chapter will review identity theory, influences on adolescent identity development, the process involved in occupational identity development and career maturity, how occupational identity development differs for low socioeconomic adolescents, and the role experiential theory can play within schools to support the occupational development of low socioeconomic children. The social justice theory of fairness points to the need for inclusive access to allow these students to transform their socioeconomic status.

Identity

Occupational Identity evolved from the work of Erick Erikson (1968) and James E. Marcia (2002). Erikson used the term as early as 1968 to describe an aspect of the "crisis" adolescents go through during identity formation. The process of identity formation, as described by Erikson, presents identity as a matrix of progression, with the successful development of each life stage dependent on the levels achieved in the preceding stages. Identity development is marked by distinct turning points crucial in determining the future direction and shape of an individual's identity (Erikson, 1968).

Erikson (1985) used an epigenetic chart to illustrate the relationship among all stages and their likely "crisis" foci of development. Erikson denoted adolescence as the stage around which identity formation in its personal and social sense reaches the point of crisis (Erikson, 1968,

1985). An individual's "family, neighborhood and school provide contact and experimental identification" (1968, p. 161) with others—older, younger, and within one's peer group. "Occupational identity" (p. 132) and an adolescent's ability to commit to a path is one aspect in the "crisis" of the adolescent stage. Erikson described the stages of development and the possible resulting identity status of each stage, which he referred to as positive or negative ego resolutions, but he did not identify the behaviors or processes that would lead to one resolution over the other (Erikson, 1985; Hamachek, 1988).

The work of James E. Marcia (2002) focused largely on Erikson's fifth stage of identity development, which concentrates on adolescents. Marcia constructed an identity status model related to occupations that supports and expands on the aspects that drive ego resolutions. Marcia's model had four resulting possibilities for the identity states of adolescents: (a) foreclosure, (b) moratorium, (c) identity achievement, or (d) identity diffusion (Marcia, 2002).

Adolescents are noted to be in a state of *foreclosure* when they follow the path "chosen" for them by their parents or other authority figures in their life without questioning its appeal or exploring other options (Marcia, 2002). Adolescents in *moratorium* are neither attached to parental aspirations nor sure of whom they will become; these adolescents are in a state of exploration to determine what future most appeals to them. An adolescent in a state of *identity achievement* has made commitments to viable representations of their future selves, distinguishing paths to pursue or not; this phase usually follows some period of exploration so that the commitment is based on something concrete. Finally, an adolescent in a *state of diffusion* is either unable or unwilling to make commitments; "their exploration period is more like aimless wandering" (p. 202) than a targeted quest to gain direction.

Achieving an identity status is based on the level of exploration the adolescent engaged in before committing or diffusing toward a stated identity (Marcia, 2002). Marcia identified that this process is likely to occur around any of the major "life areas" in which an adolescent struggles to develop an identity, these being: occupation, religion, political, social, interpersonal, and sexual identities. For example, an adolescent's social experiences may influence whom he or she chooses to associate with in the future; or their religious experiences may influence whether they choose to stay with the same religious affiliation as their parents or try some other organized religion. Occupational identity is likewise dependent on experiences with work, what their parents do, and what careers are available within the community.

Occupational Identity

Occupational identity development includes the goals, interests, and actions of students related to their occupation. Students move through a period of exploration that starts as early as the 7th-grade in some communities (Malanchuk et al., 2010). Developing an occupational identity is fostered greatly through experiences and is expressed by the levels of interest and actions that support fulfillment of those goals and interests (Malanchuk et al., 2010).

In a longitudinal study exploring the development of adolescent career aspirations, Malanchuk et al. (2010) followed a group of middle class students. Students were surveyed at five points along their development: 7th-grade, 8th-grade, 11th-grade, and ages 19 and 21. At each stage of development, Malanchuk and colleagues looked for evidence of occupational identity development. That development was based on the individual's occupational goals, degree of interest, and actions that supported the successful attainment of their goals.

Based on their findings, five categories of development were identified and labeled:

integrated, supported, clarified, conflicted, and vague. (see Table 2) The integrated stage of development was considered the most complex. This category was made up of adolescents who were active in their planning and made efforts to reach their occupational goals. They were aware of what they would need to be successful, and their activities supported the eventual manifestation of their occupational goals. At the opposite end were adolescents who fell into the vague category, the least developed form of occupational identity. These adolescents either had no goal or gave a goal they neither seemed passionate about nor were attempting to fulfill.

Table 2

Malanchuk Stages of Occupational Identity (Malanchuk et al., 2010)

Occupational Identity Categories						
Occupational Identity Criteria	Integrated	Supported		Clarified	Conflicted	Vague
Occupational Goals	Clearly Defined	Clearly Defined		Defined goal	Unclear goals (more than one goal, conflicting and in opposition)	Vague Goal / No goal
Desire/ Interest to attain goals	Strong desire and interest	Strong desire and interest	No true desire or interest	Strong interest	Dream-like interest	No strong interest
Actions that support goals	Active planning and effort put into achieving goals	No planning or effort to achieve goals	Active planning and effort put into achieving goals	No planning or effort to achieve goals	No planning or effort to achieve goals	No planning or effort to achieve goals

Note. These stages expand on the stages of identity described by Marcia (2002).

Between students who fell in the integrated or vague categories, adolescents in the supported category had clear goals and either expressed a deep desire to achieve those goals or were actively engaged in activities that would help in their goal attainment. These adolescents often demonstrated desire or effort, but not both. Next, clarified adolescents had clear ideas

about what they wanted to do but were not working realistically toward them; their aspirations seemed to be more of a dream than a goal. These students were not participating in any activities that could help them achieve their occupational goals, nor were they planning such activities in the near future. Finally, adolescents who were conflicted mentioned several occupational goals that were unrelated to each other and would require totally different paths of preparation. Together, Malunchuk's five stages of occupational identity expand on the work of Marcia (1993), describing more fully the adolescent stages of diffusion, moratorium, and foreclosure.

Malanchuck et al. (2010) showed that the occupational identity of adolescents can start to take on static forms as early as 7th-grade and continue to develop as they approach adulthood. These 7th-graders had a solid idea of what they wanted and did not want to do as possible future careers, they then made decisions that could result in the successful attainment of their goals. In the population studied, less than 10% of 7th-graders showed this complex level of integrated occupational identity. Around the 11th grade, a little over 22% of the students' responses indicated that they had reached the complex level of integrated occupational identity. There was a peak in adolescents who had evolved to the supported stage of occupational identity in the 11th grade; this group represented approximately 47% of the individuals. The supported stage of occupational identity is characterized by adolescents expressing deep desires toward their goals or engaging in activities to reach their goals, but their desires may not result from the activities in which they are engaged (Malanchuk et al., 2010). Twenty-eight percent indicated a desire to pursue "prestigious white collar jobs," and only 14% indicated an interest in fields related to communication or performing arts.

Being that middle class students and parents have different spheres of influence, one would expect different results for 11th- and 12th-grade low SES students—the target population for this study. The results for low-income students may indicate a larger percentage of students who show interest in the performing arts, athletics, or even law enforcement–related careers (Grimmett, 2006), unless they are given exposure to other fields and options. Their level of development might also be impacted by these same limitations.

Career identities during adolescence move through phases of exploration to commitment (Malanchuk et al., 2010; Phillips & Pittman, 2003). Exposure to possible occupational identities is essential for students to be able to make a decision about what to explore further, commit to as a part of their identity, or exclude from their career options (Malanchuk et al., 2010; Marcia, 2002). For students who have developed an integrated complex occupational identity by the 7th grade—as suggested by the model—the formation of occupational identity has roots in preadolescence. Researchers have noted the influence of preadolescent interactions with their environment and the people within those environments (Adragna, 2009; Messersmith, Garrett, Davis-Kean, Malanchuk, & Eccles, 2008; Phillips & Pittman, 2003), including parents, adults within their parent's social network, and adults within their communities, all of whom provide an occupational identity standard for these preadolescents (Malanchuk et al., 2010; Phillips & Pittman, 2003).

Developing a coherent and realistic occupational identity is critical for successful transition into adulthood (Malanchuk et al., 2010; Marcia, 1993). The process of preparing for future occupations has important academic developmental implications. Appropriately selecting the types of courses to take, how many of those courses one needs, and the level of rigor required

all have implications for successful attainment of postsecondary occupational pursuits for any field. The importance of math and science classes for an adolescent interested in STEM, the various levels of rigor reflected by honors or AP designations, and the ability to scaffold their academic development toward AP rigor are issues adolescents should be made aware of and counseled about. Although middle class parents and students may have that awareness, low SES students whose parents may have little to no postsecondary schooling may need additional guidance in carving a realistic path toward STEM goals.

Socialization and factors connected with socialization have been cited in the literature as influential instruments in the development of occupational identities. Parental involvement and guidance, self-perceived ability, peers, schools, and all environments frequented by adolescents influence their socialization (Adragna, 2009; Phillips & Pittman, 2003; Messersmith et al., 2008). In some instances, these socialization factors can place restrictions on occupational choices and serve as barriers to the development of occupational identity. Some students may commit to choices their parents have made or follow their peers into areas that do not increase their exposure to alternate spheres in which they might be successful.

Career Maturity

An individual's ability to make appropriate career choices is connected to his/her level of career maturity. Occupational identity development, which begins during adolescence, is influenced by social networks and by an individual's access to various careers. Career maturity stems from an individual's concern for his/her future occupation, curiosity about options, confidence in choices, and consultation of others for access to new knowledge and expertise. For instance, the extent to which an individual demonstrates curiosity in a career path, confidence in

the career fit with his or her skills, and independently chooses a career rather than conceding to pressure, indicates his or her career maturity.

Adolescents' ability to make competent choices about their future careers can be measured through the Career Maturity Inventory (Busacca & Taber, 2002; Crites & Savickas, 1996; Savickas & Porfeli, 2011). The Career Maturity Inventory developed by Crites in 1978 was the first and most popular of its kind (Salkind, 2007). Crites determined two dimensions to what was referred to as vocational decision making in adolescents and what is referred to as occupational identity in this study. The first dimension—the content dimension—focuses on the ability of adolescents to consistently and realistically use their wisdom to make vocational choices. The second dimension—termed the process dimension—assesses the disposition and competency of adolescents to make appropriate career choices (Busacca & Taber, 2002). The CMI instrument focuses on the process dimension of vocational decision making, which includes the disposition and competency of individuals as a measurement of career maturity. Disposition and competency were further broken down into subscales of concern, curiosity, confidence and consultation (Crites & Savickas, 1996). The subscales of concern and curiosity deal with an individual's disposition, whereas the scales of consultation and confidence address and individual's competency to make decisions about his or her future career.

Concern is defined by Savickas and Porfeli (2011) as the "extent to which an individual is oriented to and involved in the process of making career decisions" (p.1). Students' ability to anticipate decisions that will need to be made, their ability to envision themselves in the world of work, and their participation in preparing to make future occupational choices are all measured under the concern composite (Crites & Savickas, 1996). Students are given prompts like "I can't

seem to become very concerned about my future occupation"; or "I'm not going to worry about choosing an occupation until I am out of school," then asked to agree or disagree with the statement (Crites & Savickas, 1996). A sense of goal setting and interest in future aspirations are undertones of the concern subscale.

The curiosity subscale measures the "extent to which an individual is exploring the work world and seeking information about occupations and their requirements" (Savickas & Porfeli, 2011, p. 2). Exploring one's abilities, interests, and occupations that would best fit those abilities is an important aspect of career exploration (Crites & Savickas, 1996). An individual's desire and interest are expressed through the pursuit to determine which occupations will best fit his/her future self. Students are asked to indicate their agreement or disagreement with prompts such as "I don't know whether my occupational plans are realistic"; or "I keep wondering how I can reconcile the kind of person I am with the kind of person I want to be in my occupation" (Savickas & Porfeli, 2011, p. 3). The active pursuit of information and reconciliation of future career possibilities leads them toward a higher maturity scale score on the career maturity index.

The consultation subscale measures the "extent to which an individual seeks advice from others in making career decision and occupational choices" (Savickas & Porfeli, 2011, p. 5). This subscale speaks to the importance of seeking advice from others and striking a balance between making occupational decisions on their own and with the help of others such as their parents, or other significant people in their lives (Crites & Savickas, 1996) who are familiar with them and knowledgeable about the path they may want to pursue. This level of consultation with others and self-advocacy to gain access and information from people outside of their immediate network is particularly important for low SES individuals who have a limited home and

community network.

The confidence subscale yields results that can indicate the degree of an individual's level of concern for the future, his or her level of engagement in exploring curiosity and in consulting others to provide a level of confidence. Savickas and Porfeli (2011) defined this subscale as the "extent to which an individual has faith in her or his ability to make wise career decisions and realistic occupation choices" (Savickas & Porfeli, 1996, p. 3). Participants were asked to respond to statements such as, "I keep changing my occupational choice"; or "I have so many interest that it is hard to choose just one occupation" (Savickas & Porfeli, 1996, p. 4) by indicating whether they agree or disagree with the statements.

The initial Career Maturity Inventory was composed of 50 items that were asked in a true/false response format. In 1995, Crites revised this inventory for many reasons, most noteworthy of which was to reduce the administration and testing time, extend the CMI to the adult level, eliminate attitude and competence subscales, and incorporate select attitude and competence subscale items into the inventory (Crites & Savickas, 1996). The response format was changed from the original true/false format to an agree/disagree format. In essence, Crites tried to make the revised inventory more concise and manageable for participants and proctors.

Occupational Identity Development for Low Socioeconomic Students

Occupational identity incorporates the goals, interests, and supporting actions of an individual. The literature notes that the formation of adolescent occupational identity is tied to several factors that are also included in general identity development, such as parental support (Adragna, 2009; Meeus, 1993), peer influences (Adragna, 2009; Meeus, 1993), student self-perceived ability, and places where the socialization of adolescents occur (Adragna, 2009). In

healthy development, adolescents explore a variety of possible identities across different domains and gradually make commitments to various identities based on their experiences (Malanchuk et al., 2010). There are several domains involved in identity formation: ideological, sexual, and occupational (Grotevant, 1987; Macovei, 2009; Malanchuk et al., 2010). For low SES students, the ability to explore the occupational domain and alternate occupational identities is limited because of their limited access and exposure to a healthy range of fields.

Little can be found in the literature addressing the level of exposure and socialization factors on the process of occupational identity formation for low SES adolescents. Phillips and Pittman (2003) pointed out that the environment of adolescents in low socioeconomic communities is considerably different than that of adolescents from middle and upper class communities. Their preadolescent experiences within their environment, stemming from the adults within their communities and their parents' social networks, provide them with different identity standards during preadolescent years than adolescents from middle or high-income communities (Messersmith et al., 2008; Phillips & Pittman, 2003). "Poor children and adolescents are at increased risk of receiving negative messages about their self- worth and potential from their parents, teachers, peers and society in general" (Phillips & Pittman, 2003 p. 125). If we continue with the established view of identity formation (Erikson, 1968), which posits this process as the "preeminent task of adolescence" (Phillips & Pittman, 2003, p. 115), and further asserts that occupational identity is "critical for successful transition into adulthood" (Malanchuk et al., 2010, p. 98), then we must acknowledge the issue of social justice for low SES communities that consist predominantly of people of color.

Social Justice Theory of Access

Issues of Social Justice

Social justice has many definitions; this study proceeds through a social justice lens of access that incorporates Rawls's (2001) theory of fairness. This theory states that each individual has a right to "the freedom to pursue [one's own concept of the] social primary goods" (North, 2006, p. 512). This right has been put in jeopardy for minority youth who have limited exposure, limited social networks, and socially embedded perceptions toward athletics, entertainment, or such fields, as opposed to academic or professional fields (Grimmett, 2006). The development of functional occupational identities has the potential to transform the socioeconomic status (Meeus, 1993) of low-income minority students and students of color. As such, the issue of access to STEM career possibilities, which is lacking for low socioeconomic Black and Latino youth, is a social injustice. The social trend for minorities points to the perpetuation of poverty and in, extreme cases, incarceration, and even death (Noguera, 2008).

The United States, which has 5% of the world's population, also has 25% of the world's prisoners (Foreman, 2011). Blacks make up a large number of the individuals in the prison population (Foreman, 2011). Some researchers have cited their contribution to the prison population to be as high as 50% (Noguera, 2008). The number of Black people incarcerated greatly impacts the social dynamics of low SES communities, in which Black people are among the majority. One percent of the American adult population is incarcerated (one in every 100), yet 11% of African American males between the ages of 20 and 24 are included in these numbers (one in nine) (Foreman, 2011). These incarcerated individuals come largely from low SES communities, and most have dropped out of high school and pursued no postsecondary

interests (Foreman, 2011). When present within their communities, Black males are least likely to be hired and most likely to be unemployed (Foreman, 2011; Noguera, 2008). Their absenteeism diminishes the network of the adolescents in their lives, and their lack of education reduces the possibility that their network will give those adolescents exposure to careers within the STEM fields, or any others that may have a positive impact on transforming their socioeconomic status.

The school environment continues to be a primary site for socialization of low SES minority students. California state law on compulsory education requires that all students between the ages of six and 18 attend school unless they have met the graduation requirements or passed the necessary exams to demonstrate proficiency (California Department of Education, 2011). Middle school students have a mandatory 54,000 minutes minimum per year (California Department of Education Publication, 2007), and high school students have a mandatory 64,800 minutes per year. Those minutes are divided into 6-hour days, 5 days a week, for approximately 40 weeks out of the year; students spend a large number of their waking hours inside the school setting.

One may even argue that school is the most important site for redefining socialization, and aiding in the development and expansion of occupational options and identities. Being primary sites for adolescent socialization during this influential period, schools should establish systemic methods for increasing minority exposure to various fields in ways that are strategic and relevant. Experiential learning theory provides a functional framework that schools can use to guide the implementation of a curriculum that is rigorous and works toward the development of students' occupational identities.

A Curriculum of Access Experiential Learning Theory

Experiential learning theory provides a cyclical process to teaching and learning that can align with the processes of identity development and exploration as described by Grotevant (1987). The foundations of experiential learning theory were first laid out by Dewey in his 1953 essay "Experience and Education" (Dewey, 1988), in which he wrote of the need to transform education practices from a system that prepares students for future responsibilities by telling them about the past or by using text as the primary means of transmitting knowledge. The need to connect the past to the present in a way that is relevant to student lives through experience is emphasized. Dewey referenced the cyclical nature of experience-based learning and its reflective component that drives future decisions and experiences. David Kolb developed a model of experiential learning theory based on Dewey's writings.

Kolb's theory of experiential learning has been widely used in many sectors of postsecondary education. It has been referenced in STEM-related fields (Abdulwahed & Nagy, 2009; Kolb & Kolb, 2009; Messersmith et al., 2008), career and occupational exploration (Atkinson & Murrell, 1988; Chisholm, Harris, Northwood, & Johrendt, 2009), and aligns well with a reflective process of identity development and exploration (Grotevant, 1987; Phillips & Pittman 2003). This learning theory contains four constructs that have basis in metacognitive and concrete experiences, very similar to the exploration and evaluation process of identity development.

Experiential learning theory as presented by Kolb is an interrelated cycle of experience and learning, with the starting point grounded in type of experience. An experience such as a lecture may be an abstract experience, also termed abstract conceptualization (AC) (Kolb, 2008);

this term implies that the experience is grounded in logical thinking and rational evaluation to further ideas (Atkinson & Murrell, 1998). Following abstract conceptualization (AC) is active experimentation (AE), where one is actively engaged in testing the abstract concepts; this experience can serve as a guide for creating concrete experiences. Concrete experiences (CE) are lived experiences in which an individual is submersed and is the foundation for the reflective observation mode (RO) of the cycle. In the reflective observation mode, individuals try to unbiasedly reflect on their experiences and determine how a concrete experience will shape or reshape beliefs represented by abstract conceptualization. From this point, individuals can determine the next active experimentation and concrete experience activity, resuming the cycle through a new lens.

The use of such a model, when applied to STEM in the educational setting, would provide students with concrete experiences (CE) they could use to determine (RO) if a career in STEM is a realistic option for them (AC). The experiential learning model, when followed in its entirety—inclusive of all four constructs, not only allows for access but also enables reflection, which is important to help students analyze their goals and options and approach their future careers with a degree of certainty. With choices grounded in lived experiences, students are less likely to make whimsical career decisions made purely from ideas of grandeur and material wealth.

Undoubtedly a career within one of the STEM fields can come with a level of wealth that will indeed transform the socioeconomic status for minority youth. The idea is to have students match their skill level and desires to an appropriate career choice so as to benefit themselves and society as a whole. Social justice can be achieved through the transformation of the student, their

socioeconomic status, and their contribution to society. This trajectory becomes a real possibility for low SES students through access and exposure to STEM fields.

CHAPTER THREE

METHODOLOGY

Themed STEM magnet schools have the potential to address the lack of access to STEM fields for low SES Black and Latino minority students. A look at identity theory in Chapter Two, provided insight to the diminished social network of low SES students, factors that limit exposure to careers that have the potential to transform the socioeconomic status of minority students, the effect of those factors on the occupational identity development of low SES students, and the possibility of the using experiential learning theory within the education setting. In this chapter, the methods implemented to examine the effectiveness of an experiential curriculum that provides access and exposure for Black and Latino minority students to STEM fields will be detailed.

Context

Archard Medical Magnet High School was built to provide students with exposure to the many career possibilities in the medical field. The school was founded in 1982 by a group of community activists, concerned parents, physicians, and administrators from the nearby medical school and hospital. “Their goal was to address the under-representation of minorities in the health care profession” (Los Angeles Unified School District, 2012a). The Hospital Careers Program at this site was one of the first in the district. Initially the school served only grades 10-12 and housed 220 students; at the time of this study, all students participated in the Hospital Careers Program.

Over the years, the school grew to include 9th-grade and, as of 2013, housed 1,600 students. Of those 1,600 students, 54.6% were African American, 42.8% Latino, 1.4%

Caucasian, and 1.2 % were of other ethnicities (Los Angeles Unified School District, 2012b). The population was 70% female, 30% male, and largely made up of low socioeconomic status students (70%), as defined by the number of students qualifying for the state free or reduced lunch program and supported by the school's Title I status.

With a growing population and a limited amount of sites, the program served 11th-graders only and criteria had been developed for students wishing to enter the Hospital Careers Program. "Students now must have at least a 2.5 G.P.A. in math and science classes and an overall G.P.A. of 3.0 in their 9^{th} and 10^{th} grade classes" (Los Angeles Unified School District, 2012a). The program served 240 juniors at over 90 site locations throughout the Los Angeles area. These sites varied from hospitals to clinics and were in various departments such as obstetrics, oncology, anesthesiology, hospital administration and more.

The magnet's use of an experiential curriculum, which included students spending time in a professional environment where they have a chance to interact and work alongside adults in the medical field, was one of the highlights of the Hospital Careers Program. Use of experiential learning theory allows the program to take students through a metacognitive and experiential process designed to help students determine if they would like to continue to pursue a career in STEM-related fields. Students participated in concrete experiences (CE) at their assigned field sites and reflected (RO) in their field steno pads about their experiences. This reflection helps to shape the students' ideas about their possible selves (AC) and to guide their level of participation and self-advocacy at their sites (AE). By the end of a school year, students should have a better idea if a career in STEM is something that they can incorporate as a part of their own identity as well as possible postsecondary pursuits.

Students receive recommendations to be a part of the Hospital Careers Program by their teachers and counselors at the end of their sophomore year. Students who are interested in participating in the program and meet the program requirements apply to be a part of the program. In their applications, students indicate their career interests. The magnet coordinator screens the applications and uses student interest information to match students with an appropriate site. The magnet coordinator informs the counselor and accepted students of their acceptance toward the end of their sophomore year. Students are then programmed into the careers schedule by their counselor, and students and parents begin purchasing their scrubs and lab coats to be worn at their sites the following year. At the beginning of their junior year, students go through a period of training (patients' rights, confidentiality etc.) by their hospital careers teachers and are processed (finger printed and screened for vaccinations) by their sites. After receiving clearance, students are assigned to a supervisor at their site, to whom they report once a week. Students assigned to sites within walking distance walk to their sites; students assigned to sites not within walking distance are transported via school bus and are shuttled to and from their sites. Juniors not within the Hospital Careers Program are on a regular block schedule for the week and do not experience the same level of engagement with professionals as do students within the Hospital Careers Program. These students may be exposed to professionals through various guest speakers, distant learning sessions, and annual campus career days coordinated by the magnet coordinator.

Research suggests that low socioeconomic students lack legitimate access to and knowledge of professional fields outside the scope of their parental and community spheres of influence (Adragna, 2009; Grotevant, 1987; Macovei, 2009; Messersmith et al., 2008; Phillips &

Pittman, 2003). Earnings within STEM fields average a minimum 30,000 dollars more than non-STEM fields and careers (US Bureau of Labor Statistics, 2012; Terrell, 2007); as such, individuals within these fields are least likely to be found in low SES communities. Use of an experiential curriculum has the potential to provide access and exposure to STEM fields for underrepresented low SES students.

Purpose

This study examined the influence of an experiential curriculum, wherein students are exposed to various medical professions through a yearlong internship, and the state of occupational identity for low SES Black and Latino students who participated in the program. Specifically, this study measured the state of occupational identity, level of access through self-advocacy, and career maturity of low SES minority students participating in an experiential curriculum at Archard Medical Magnet High School.

Occupational identity development includes the goals, interests, and actions of students related to their occupation. For example, what goals do students possess for their future occupation? How strong is their interest? And, what actions are they taking to attain their career goals? A student interested in pursuing a career in one of the STEM fields may demonstrate interest through participation in science-related clubs or activities on and or off campus, or may indicate a high level of certainty in the future career choices. These students will have consulted parents, teachers, counselors, peers, or anyone he or she deems knowledgeable to aid them in determining the appropriate direction for postsecondary success and what colleges may be good choices for their future career goals. In addition, these students challenge themselves with honors, advanced placement (AP), or other courses that will encourage critical thinking and

prepare them for the challenges of postsecondary coursework.

As students access their counselors, teachers, peers, family members, and others for insight about their future selves, they frame questions, seek information needed to formulate answers (Freeman, 2008), and develop self-advocacy in the process. Among the many factors of self-advocacy is the ability of individuals to effectively communicate or negotiate their interests, desires, and needs (Van Reusen, 1996). Students are guided to identify and prioritize their needs, choose goals, and increase their interests and efforts towards goal attainment through their developed self-advocacy (Van Reusen, 1996). This work helps them practice decision-making and establish "self-leadership skills they will use throughout their lives" (Freeman, 2008, p. 12), thus strengthening their self-advocacy skills and supporting their growth in making effective decisions (Freeman, 2008).

Career maturity focuses on the development process of individuals, which includes the disposition and competency of adolescents to make appropriate career choices (Busacca & Taber, 2002; Salkind, 2007). The disposition and outlook of students, along with their level of self-advocacy and resourcefulness, are important factors in determining their level of career maturity. For example, an individual not concerned with choosing an occupational trajectory shows very little curiosity about the possibilities that exist for him or her and does not make use of networks or resources to shape future occupational goals would score low on the career maturity scale.

Research Questions

This study was designed to address the following questions:

1. What are the experiences of students within the Hospital Careers Program, an experiential curriculum, at Archard Medical Magnet High School?
    1.1 What are the strengths and weaknesses associated with the experiential program through the eyes of the students?
2. Does the academic curriculum outside of the careers program support the development of students?
3. What is the state of occupational identity, access through self-advocacy, and career maturity for low SES Black and Latino students who are participating in the hospital careers experiential curriculum at Archard Medical Magnet High School?

The development of occupational identity for students is based on their goals and actions that support goal attainment (Malanchuk et al., 2010). Atkinson and Murrell (1988) have stated that experiential learning provides individuals the opportunity to explore their interest through concrete activities and take steps toward implementing a developed career plan, and offers a method that can be applied to future decision-making. Being that students in the experiential program have had experience setting goals based on their ability, as well as a lived experience around their interest and goals, they should exhibit more integrated stages of occupational development (Malanchuk et al., 2010).

Students in the Hospital Careers Program may have increased levels of self-advocacy and resourcefulness as a result of increased exposure and access to an extended network through the Hospital Careers Program. Being that occupational identity development begins in the middle

school years (Malanchuk et al., 2010), and the social network of low SES students is greatly diminished (Phillips & Pittman 2003), adolescents may already be in a state of foreclosure, committing to an occupational path similar to that of their parents or others in the community without any exploration; or they may be in a state of diffusion whereby they refuse to commit to a career path at all (Marcia, 2002). Without the experiential curriculum to provide guidance, insight, and opportunity, students may have limited practice with goal setting and actions that support attainment, and little to no access to individuals outside of their community sphere. Career maturity is based on the disposition and self-advocacy of students. Their concern for the future, expressed interest, levels of curiosity, confidence in themselves, and ability to make use of their network to help them make appropriate decisions are tied to the maturity rating of students (Savickas & Porfeli, 2011). Students in the Hospital Careers Program have an additional network of individuals, such as hospital careers teachers and the magnet coordinator who runs the program. This additional network and the support it provides should contribute to improved disposition and self-advocacy characteristics of students in the Hospital Careers Program.

Being a STEM-themed magnet school, Archard Medical Magnet High School had a college prep curriculum available to all students. Several STEM program features were embedded, such as a school-wide science fair required for students at all grade levels, yearly school-wide STEM themes, biyearly career days, a 4-year lab-based science program, and several STEM-themed campus clubs to encourage development in all fields. This study will measure students' involvement and experiences with these programs, which extend beyond the Hospital Careers Program and are a part of the school curriculum for all students.

Participants

The targeted population for this study was low-income Black and Latino minority students enrolled in their junior year at Archard Medical Magnet High School. Junior students in the careers program were targeted and invited to participate in the study because this experiential program was only offered to students during their junior year. Fifty-nine participants (N = 59) who were enrolled in the experiential Hospital Careers Program and who returned signed parental consent forms and student assent forms were surveyed (See Table 3). Of those surveyed, 47 were female (80%) and 12 were male (20%), similar to the school gender population, which was comprised of 70% female and 30% male. Of the 59 participants, 51% reported to be Black or African American, 34% reported to be Hispanic or Latino, 3% reported as other, and 12% reported as multiple ethnicities. This ethnic and gender breakdown of the sample is representative of the school ethnic make-up, which was reported as 55% Black or African American, and 43% Latino.

Table 3

Student Self-Reported Demographic Data (N=59)

Ethnicity	*GPA*	*Class Rank*	*Gender*
Black/African American 50.8%	2.0-2.5 1.7%	1 1.8%	Male 20%
Hispanic/Latino 33.9%	2.6-2.9 10.2%	10 1.8%	Female 80%
Other 3.4%	3.0-3.4 39%	17 1.8%	
Multiple Ethnicities 11.9%	3.5-4.0 32.2%	32 1.8%	
	I don't know 16.9%	35 1.8%	
		70 1.8%	
		I don't know 89.5%	

Reported GPAs and class rank, respectively, were Black/African American 2.0-2.5 (2%), 1 and 1.8%, Hispanic/Latino, 2.6-2.9 (10%), 10 and 1.8%. other 3.0-3.4 (39%), 17 and 1.8%, and

multiple ethnicities 3.5-4.0 (32%), 32 and 1.8%. Of the juniors surveyed, students self-reported to be predominantly African American (51%). Approximately 71% of students reported to have a GPA in the range of 3.0-4.0, though 90% of them did not know their rank in comparison to other students within their grade level.

From these survey participants, 5 students were selected to participate in interviews. The interview participants were all juniors enrolled in the Hospital Careers Program and had completed the questionnaire. These students were interviewed to capture their experiences in the Hospital Careers Program beyond what the survey data would indicate, and triangulate survey findings on student occupational identity, level of access and student career maturity.

Student number one was a biracial African American female. In addition to the Hospital Careers Program, she was enrolled in five honors classes and one advanced placement class. She was a high performer trying to challenge herself even further with an advanced placement class. She chose French as her world language and was enrolled in honors French 3 and geometry-level math. She is interested in pursuing a career in medicine.

Student number two was an African American female of Nigerian decent. In addition to the Hospital Careers Program, she was enrolled in one honors class, two advanced placement classes, and two regular classes. She chose Spanish as her world language and was in Spanish 2 and trigonometry-level math. She had a rigorous and challenging schedule. She was interested in pursuing a career in medicine.

Student number three was an African American female of African American and Afro-Caribbean descent. In addition to the Hospital Careers Program, she was enrolled in one honors class, three AP classes, and one regular class. She had chosen French as her world language and

was enrolled in honors French 3 and geometry-level math. Taking three AP classes is considered to be an extremely rigorous load for juniors. She was interested in pursuing a career in medicine.

Student number four was an African American male. In addition to the Hospital Careers Program, he was enrolled in four regular classes and one AP class. He chose Spanish as his world language and was enrolled in Spanish 3 and geometry-level math. He was trying to challenge himself with an AP class to determine if college was a viable option for him. He was undecided about the career he would like to pursue, and showed vague interest in pursuing a career as an electrician.

Student number five was an African American female. In addition to the Hospital Careers Program, she was enrolled in five regular classes. She had chosen Spanish for her world language and was enrolled in Spanish 3 and geometry-level math. She indicated strong interest in pursuing a career in the performing arts and as an obstetrician/gynecologist (OB/GYN).

Design and Procedures

Design

To answer the research questions, 59 students participating in the Hospital Careers Program were surveyed, and their responses were used to determine their occupational identity, level of career maturity, and access through self-advocacy. Surveys were administered to students while they were participating in the program because that is when the program is most salient for the participants. In addition to the survey, five juniors enrolled in the experiential Hospital Careers Program were interviewed. Interviews allowed for in-depth questions to gain additional insight into the experiences of students in the Hospital Careers Program. These interviews were included in the study to truly understand the students' experiences with the

program, corroborate the survey responses and reduce any potential confounding variables. Taken together this study utilized a triangulation mixed-methods design, which allows the strength of both types of studies (generalizability and insight-related to context) to be utilized by the researcher. Open-ended questions were placed throughout the questionnaire as a source of qualitative data in addition to the interviews that were conducted.

Procedures

To recruit participants, junior students enrolled in the experiential curriculum were approached regarding participation in the study during their Hospital Careers Class. Classroom teachers, who were supportive of the project, made the initial contact with students who were asked to participate in a voluntary confidential survey about their future career interest and in a career maturity inventory to assess their beliefs about future careers. Only students who provided the signed parental consent forms and student assent forms were included in the study. Permission to conduct the study was obtained from on-campus administrators, the district-level Institutional Review Board (IRB), and the Loyola Marymount University (LMU) IRB.

To measure occupational identity, access, and career maturity, surveys were administered during the fall semester after school so as to not impact academic learning time. Because 75% of the population was bused into the school site, the magnet program provided late buses that left at 4:30 pm (approximately 1½ hours after school dismissal). This schedule allowed students to participate in extracurricular clubs, tutoring, and other on-campus activities. Surveys were administered on days when the school provided late buses, to maximize participation of students who were bused in and did not live in the local area.

After completing the survey, 5 students were selected and interviewed to provide in-depth triangulation on their occupational identity levels, access through self-advocacy, and level of career maturity. The purpose of these interviews was to access student voices in a way that the quantitative questionnaire did not allow, while providing the opportunity to ask additional clarification questions. These interviews were audio recorded and transcribed for accuracy. The interviews provide insight into student perspectives about their reasons for their career interest, their perspectives on a STEM career, and what factors influenced their career choices (e.g., hospital career program, etc.). Responses to interview questions were analyzed according to the guidelines set out by Malanchuk et al. (2010) and coded for the key variables of this study to determine the degree to which students in the experiential program revealed an integrated occupational identity.

Measures

Survey

The survey instrument used in this study (See Appendix A) was the primary instrument used to collect data to measure students' occupational identity, access through self-advocacy, and career maturity. Additionally, participation in school activities beyond the careers program was also measured. The questionnaire was designed with Likert-scale items; some were adapted or taken directly from field-tested surveys (Malanchuk et al., 2010), whereas others—such as the open-ended questions—were created to assess the main variables of interest. Student responses to the questionnaire provided data on the occupational identity levels, access through self-advocacy, and career maturity of the students within the study. Use of a questionnaire allows for a researcher to gather responses from many students at one time. A complete copy of the

questionnaire is provided in Appendix A. Research on survey methodology cautions that careful wording of the questionnaire items is important for accurate survey results (Schwartz, 2007). In some cases, the wording of field-tested items was modified slightly for the targeted population. Students were asked questions about their activities on and off campus to determine if they may have outside influences other than the Hospital Careers Program or the magnet program. Open-ended questions provided additional insight that cannot be obtained from yes/no or Likert-type questions.

School Program and Culture

Nominal demographic data were collected and calculated to represent gender, ethnicity, career interest and participation in the schools' experiential curriculum. In addition, students were asked to report indicators of academic performance in terms of grade point average (GPA), class rank, and their participation in advanced placement courses. These items provided evidence of a rigorous curriculum that would support success in STEM fields in postsecondary pursuits, as noted in the literature by Whalen and Shelley (2010), and of the number of students who were challenging themselves to that end. This information helps to determine if the aspirations of the students aligned with their academic performance and served to support the state of the student's occupational identity and future career interest. Additional demographic questions about the school program were included to measure the curriculum experienced by students outside of the Hospital Careers Program. Students were asked about the development of communication and technical skills and specifically about the development of scientific literacy and inquiry within their classes. Questions on the survey that provide data about the curriculum are as follows (See Tables 4-6):

Table 4

Scientific Literacy & Inquiry

1. In my 9th and 10th grade science classes' **labs were a regular** part of our science curriculum:
2. In my 9th and 10th grade science classes we were required to **write up lab reports** to demonstrate our understanding of the concepts and processes being covered in our labs:
3. In my 9th and 10th grade science classes we were required to **read scientific text including the text book**:
4. In my 9th and 10th grade science classes we were required to read scientific text **other than the text book**:
5. In the 9th and 10th grades the curriculum in **classes other than** my science class also touched on scientific inquiry, scientific concepts or science careers:

Table 5

Communication skills within the classrooms

I've made presentations to my teacher and class to communicate ideas
I've participated in group or partnered activities that required me to collaborate and present ideas.
I've created visual posters or displays to communicate ideas
I've been required to use media and technology (computer programs, video, etc.) to communicate ideas
Other

Table 6

Technical Skills within the classroom

I've used pipettes
I've used equipment associated with gel electrophoresis
I've used microscopes
I've used burettes
I've used tools for dissection
I've used probes and meters (pH, light, motion etc.)
I've written lab reports to communicate my understanding of concepts
Other

Occupational Identity

The identity state of students related to occupation is determined by their goal setting and development of their occupational selves. A student with a well-developed occupational identity

is classified as having integrated his or her occupation into his or her overall identity. These students have well defined goals with supporting actions that lead to goal attainment. The questionnaire included 7 Likert-type items (See Table 7) measured on a 6-point scale whereby 1 corresponded to *strongly disagree* and 6 corresponded to *strongly agree*. Four questions (1, 2, 3, and 5) were taken from the Extended Objective Measure of Ego Identity scale (EOME-2 Revised) (Bennion & Adams, 1986) and revised slightly for the targeted population. Three additional questions (4, 6, and 7) were taken directly from the EOME-2 Revised (Bennion & Adams, 1986).

Table 7

Occupational Identity Questions: Identity

1. I haven't chosen the occupation I really want to get into, and I will probably work at whatever is available until something better comes along:
2. I am still trying to figure out my abilities (what I am good at) and what work would be right for me:
3. I might have thought about a lot of different **jobs**, but there's never really been any question about what I will do since my parents told me what they want me to do:
4. It took me a while to figure it out but now I really know what I want for a **career**:
5. My parents decided a long time ago what I should go into for employment and I'm following through with their plans:
6. It took me a long time to decide but now I know for sure what direction to move in for a career:
7. I just can't decide what to do for an occupation. There are so many possibilities:

Student responses were input to SPSS and checked for internal consistency and reliability by determining its Cronbach's alpha score. Findings suggest two subscales were present in the EOME-2 scale used to measure Occupational Identity: Foreclosure and Consideration. Specifically, analysis showed that items one, three, and five, which address a foreclosure mind

frame and were modified slightly for this population, were moderately reliable (alpha = 0.66). This level of moderate reliability was reached after item two was removed. Items four, six, and seven address goal setting and the amount of consideration students have given to their future occupation. The Cronbach's alpha score indicated low reliability for questions 4 through 7 but further analysis indicated that the removal of item seven increased reliability (α = 0.62). As a result, the Occupational Identity variable was divided into two subscales: Foreclosure and Consideration.

Access

Student actions in support of their goal attainment are another factor of occupational identity and indicate a degree of access to their chosen career. Students who have a well-developed integrated occupational identity will self-advocate to gain additional practice and exposure to support their goal attainment (Van Reusen, 1996). To measure access, students were asked to respond to 6 questions (See Table 8) about the actions they were taking to support their goal attainment. These 6 items were measured on a 6-point Likert scale, which ranged from 1—"almost never"—to 6— "almost every day." These questions were field-tested by Malanchuk et al. (1999) and borrowed for the purpose of this study.

Table 8

Occupational Identity Questions: Access

1. How often do you talk with your friends about plans for education after high school?
2. How often do you talk with your teachers/counselors about plans for education after high school?
3. How often do you talk with your parents/guardians about plans for education after high school?
4. How often do you talk with your friends about future job/career plans?
5. How often do you talk with your teachers/counselors about future job/career plans?
6. How often do you talk with your parents/guardians about future job/career plans?

These items measured students' access to information and opportunity through self-advocacy and consultation. The 6 items were examined for internal consistency and reliability, and yielded a strong reliability (alpha = 0.84). As such, a mean composite to represent access was created.

Career Maturity

To measure career maturity, items created by Crites (1978) and revised by Crites and Savickas (1996) were administered to students. This scale of Career Maturity contains four subscales: Concern, Curiosity, Consultation, and Confidence. According to the authors, "Because the items in the 1995 CMI were selected from the 1978 CMI, they have the same reliability and validity as the items in the previous edition" (Crites & Savickas, 1996 p. 136). Other studies have indicated that the CMI-R has a reliability and validity measure lower than the 1978 version and should be used as a supplement, not as a sole indicator (Busacca & Taber, 2002); as such, the revised CMI (CMI-R) was used in this study but supplemented with data from interviews. Furthermore, reliability was checked to determine whether these items were appropriate for this sample. The Kuder Richardson formula (KR20) was used to determine the internal reliability and consistency for dichotomous choices. Reliability ranges for the KR20 are

a low reliability for scales that have a value less than 0.50, moderate reliability for scales that fall between 0.50-–0.80, and high reliability for scales that have a value greater than 0.80 (Tan, 2009). Sample questions from the CMI-R that address each of the subscales of Concern, Curiosity, Consultation, and Confidence have been included in lists below.

Table 9

Concern Subscale (Taken from Crites CMI-R)
1. There is no point in deciding on a job when the future is so uncertain.
5. I can't seem to become very concerned about my future occupation.
9. I seldom think about the job that I want to enter.
13. I am not going to worry about choosing an occupation until I am out of school
17. As far as choosing an occupation is concerned, something will come along sooner or later.
21. I really can't find any work that has much appeal to me.

The Concern scale was found to have low reliability (*KR20* alpha = 0.44). Removing items did not help increase reliability.

Table 10

Curiosity Subscale (Taken from Crites CMI-R)	
2.	I know very little about the requirements of jobs.
6.	I don't know how to go about getting into the kind of work I want to do.
10.	I am having difficulty in preparing myself for the work I want to do.
14.	I don't know what courses I should take in school.
18.	I don't know whether my occupational plans are realistic.
22.	I keep wondering how I can reconcile the kind of person I am with the kind of person I want to be in my occupation

The Curiosity subscale was found to have moderate reliability with a KR 20 value of 0.71. An index representing curiosity was created by summing across the items.

Confidence Subscale (Taken from Crites's CMI-R)

Table 11

Confidence Subscale (Taken from Crites CMI-R)

3.	I have so many interest that it is hard to choose just one occupation.
7.	Everyone seems to tell me something different; as a result I don't know what kind of work to choose.
11.	I keep changing my occupational choice
15.	I often daydream about what I want to be, but I really have not chosen an occupation yet.
19.	There are so many things to consider in choosing an occupation; it is hard to make a decision.
23.	I can't understand how some people can be so certain about what they want to do.

The Confidence subscale was found to have strong reliability, with a KR20 value of 0.83. An index representing confidence was created by summing across the items.

Table 12

Consultation Subscale (*Taken from Crites CMI-R)*

4.	Choosing a job is something that you do on your own.
8.	If you have doubts about what you want to do, ask your parents or friends for advice.
12.	When it comes to choosing a career, I will ask other people to help me.
16.	I will choose my career without paying attention to the feelings of other people.
20.	It is important to consult close friends and their ideas before making an occupational choice.
24.	In making career choices, one should pay attention to the thought and feelings of family members.

The Consultation subscale had low reliability with a KR20 value of 0.36. Removing items did not help increase reliability.

After analysis of the Career Maturity subscales, the researcher removed the scales that measured concern (KR20 value of 0.40) and consultation (KR20 value 0.36) due to low internal reliability and consistency. These items, although vetted previously, had not yet been tested among this population, which may have contributed to the low reliability found for the two subscales. However, aspects of career maturity were still provided by the curiosity and

confidence subscales. Aspects of the removed subscale of consultation were likely captured in the composite of access because both scales included items regarding seeking consultation and advice from others, and the access composite had a high reliability of $\alpha = 0.84$. Similarly, aspects of the removed subscale of concern were likely captured by interview questions, and student actions such as participation in science-related clubs and activities for students interested in STEM careers and similar actions for students interested in other fields. As such, even though low reliability led to the removal of two of the four subscales, career maturity was still measured by curiosity and confidence, both of which had adequate reliability. Insight to career maturity of students will be supplemented by additional data from interviews.

Interviews

Semistructured interviews occurred after the surveys had been administered. A total of five interviews were conducted to ask in-depth questions and gain additional insights into the occupational identity, access, and career maturity of students and their general perceptions of the experiential program. (see Appendix B) Each interview was recorded and transcribed for analysis. Interviews were conducted in a semistructured format, which allows the researcher to follow students' responses, but also to adhere to a structured preset list of questions. Students were asked questions about their career aspirations. For example, students were asked: "Do you have a sense of the career you'd like to pursue?" Students were asked about their degree of certainty toward their career aspirations, including, "How sure are you that this is the kind of career you would like to have?" And what type of activities they were engaged in to support their aspirations, "What are you currently doing to make your future aspirations a reality?" Their responses to these questions were used to measure the occupational identity of these students.

Amongst the preset questions, students were asked to respond to access questions, such as, “Have you talked to anyone about your future career plans? If yes who?” and "How has the conversation helped you?” The aim of these questions was to determine whom students access for information about their future career aspirations and what types of information they gain from those conversations.

To determine career maturity of students, they were asked four preset questions that each addressed one of the subscales of maturity, as described by Crites (1978). The aim of these questions was to guide student responses and ensure responses that could be analyzed to determine student career maturity. Students were asked: “How did you become interested in becoming a (fill in response to occupation interest)?” This question, set out to address Crites’ (1978) Curiosity subscale. To address the confidence subscale, students were asked “On a scale of one to ten, how sure are you that this is the career you’d like to pursue?” To address Crites’s consultation subscale, students were asked, “Have you ever met/ know/ talked to anyone in this field?” Lastly, in an attempt to analyze student concern, students were asked to respond to: “What would a day as a (fill in response to occupation interest) look like?”

Analysis

Open-ended responses that address the strengths and weaknesses of the program on the questionnaire were coded for emergent themes. For aspects of the magnet curriculum outside the experiential careers program, composites were created and analyzed for internal reliability and consistency. Next the mean and standard deviation was tabulated and frequencies calculated. For the students in the study, their identity status as it related to occupation, their level of access through self-advocacy, and career maturity were measured via survey items, and composites

were created based on appropriate internal reliability. The mean and standard deviation for each of those composites were calculated. Frequencies of student responses provided descriptive data for each composite as well as general demographic data.

Interviews were coded to determine student goals, interest, and actions that supported the attainment of their goals according to the matrix that depicts the work of Malanchuk et al. (1999). This coding scheme, which matches the key variables of this study, was applied to transcribed interviews, and served as a triangulation for responses from the quantitative elements of the questionnaire. For example, interview responses were coded using Malanchuk's occupational identity matrix (1999). Based on their responses, students were categorized into one of the five categories outlined by Malanchuk et al. (1999) (Integrated, Supported, Clarified, Conflicted or Vague). Specifically, students who responded to the interview questions and were clear about their occupational goals, showed strong interest and desire to attain their goals, and indicated they were actively engaged in activities that support achievement of their goals were considered advanced in their occupational identity and were classified as Integrated. Students who were unclear about their occupational goals and not engaged in supporting activities or in any activities, or were engaged in activities that did not support their career attainment, were classified as Conflicted or Vague.

Responses to questions about access were coded for emergent themes in the same way as open-ended responses were coded on the questionnaire. Patterns and frequency of responses were examined across participants. This information served the triangulation to see if the same themes emerged within student interviews as within the coded responses of the questionnaire and the access composite.

Career Maturity responses were coded to determine if students provided a mature response to the interview questions. For example, when asked about how they became interested in their career choice, a mature response would be based on some sort of experience or sound research that connected their interest and ability to the field. Such a response to this question, which was designed to address Crites's Curiosity subscale, allowed students to demonstrate how their interest was developed and the researcher to determine if their career choice was more concrete versus abstract. To address Crites's Confidence subscale, students were asked to respond to their certainty surrounding their career choice, on a scale of 1 to 10. A mature response that would indicate confidence would be a score of 8 or higher. A score of 5 to 7 indicated some sort of conflict and lower than 5 indicated high levels of uncertainty. To address consultation, students were asked if they ever spoke to anyone within their field of interest. A mature response would indicate that they had, but depending on their career choice, students might not have access to professionals in their field. Lastly, students were asked to describe a typical day as a professional in their stated occupational career. According to Savickas and Porfeli (2011), the ability of students to envision themselves in a line of work points to a mature stance for the concern subscale.

Lastly, interviews were transcribed and analyzed for emergent themes regarding the strengths and weaknesses of the Hospital Careers Program. In that same way, open-ended responses on the survey—which also asked students about the pros and cons of the program—were coded for the most frequently occurring themes. These responses answered the research questions in an attempt to uncover the experiences of students in the careers program through student voices.

CHAPTER FOUR

RESULTS

Very few whole school STEM magnet schools currently exist. A growing number of schools, charter and otherwise, are adopting a STEM focus. Archard Medical Magnet High School was one such program and has potential for increasing and supporting students toward STEM careers via its experiential curriculum. This curriculum included placement of students at hospital sites to work alongside professionals in the field during their junior year. Reaching low SES minority students who are underrepresented and an untapped resource for America is at the core of this study because students who attend Archard Medical Magnet High School are predominantly Black and Latino and from low socioeconomic backgrounds. As such, the purpose of this study was to determine the influence of student experiences within the experiential curriculum on the levels of student occupational identity, access, and career maturity. To determine the program's influence, surveys were administered and students were interviewed about their experiences. This chapter will illustrate the findings of this study.

Interest in STEM Careers

Fifty-nine students enrolled in the Hospital Careers Program at Archard Medical Magnet High School participated in the survey. Students reported that in their 9th-grade year, approximately 76% (N = 57) had an interest in medicine and or science as a future career. (see Table 3) By their junior year, and after a semester in the Hospital Careers Program, 73% (N = 59) still had an expressed interest in medicine and/or science as a future career possibility. The number of "undecided" students decreased by 4%, though students did not seem to move towards STEM-related careers but toward "other" fields.

Table 13

Student Career Interest (Percentage)

Field	9th grade	11th grade
	(N =57)	*(N =59)*
Medicine	54	54
Science	11	12
Medicine & Science	11	7
Undecided	16	12
Other	9	15

Among the students interviewed, 4 out of 5 expressed interest in pursuing a STEM-related field (80%), with 3 out of these 4 reporting an interest in medical-related fields. One student, however, reported being interested in the performing arts and one, though having expressed an interest in a science-related career, was still undecided about whether it was the right career path for him. Taken together, the data suggest that most students attending Archard Medical Magnet High School were interested in the STEM occupations and, by their junior year, students were starting to develop an idea about whether their future career would be in the STEM field.

Student Experiences within the Hospital Careers Program

The first research question attempted to assess the experiences of students within the experiential Hospital Careers Program at Archard Medical Magnet High School. Specifically, student responses shed light on the strengths and weaknesses associated with the experiential curriculum. To answer this question, students in the Hospital Careers Program were asked specifically about communication and technical skills they developed at their assigned site within the survey questionnaire in a Likert format. In addition, within the questionnaire, students responded to open-ended questions about the types of skills they developed at their site; their

responses were recorded and coded to determine patterns amongst their responses. Participants who were interviewed were also asked about the things they liked most and least about the experiential program to gain insight to survey responses.

Strengths of the Program

Not all students wrote in responses to the open-ended questions, and some students provided more than one response as feedback. Of those who responded to these survey items (43 students), 73% cited exposure and experience to be a major strength of the experiential program. (see Table 14) Specifically, exposure and experience emerged as themes from student responses which included: "the experience was hands on" (11 of 43 students, or 26%); "I was exposed to a career that I'd never heard of" (4 of 43 students, or 9%); "I was exposed to the career I'm interested in" (8 of 43 students, or 19%); and given new experiences and exposure to new things (20 of 43 students, or 47%). Other aspects outside of experience and exposure that students valued highly about the experiential program included the chance to work with adults (19%) and professionals at their site, of which doctors and nurses were specifically cited (20%).

Table 14

Student-Coded Questionnaire Responses about Strengths of the Program

Responses	No. of Students	%
Experience and exposure	43	73
Working with Veterans	2	3
Working with Children	3	5
Working with People	11	19
Positive environment at site	3	5
Working with professionals	12	20
Taking Vitals	2	3

To further gain insight to the experiences of students in the program, interview data were coded and used to corroborate the findings from the survey presented above. Of those students interviewed, 4 out of 5 cited experience and exposure as the major strengths of the program. Student number one commented, “The hospital program has most definitely helped me a lot, um it . . . provide(d) me with even more choices . . . the hospital program really just opened (me) up to other options.” Student number two commented, “I get to see real stuff, nasty stuff, but it’s interesting stuff.”

Two out of the five students interviewed mentioned autonomy and the ability to work with professionals in an unrestricted way. Student number one stated:

> I’m a really huge fan about how much freedom they give us [the careers program] . . . I [was] really astonished to find out . . . they [hospital careers teachers] don’t just come in and stay there with you, and they just allow you to go and do what you want and utilize your time how you’re going to do it.

Student number four stated, “They give you your own space . . . I like that it gives me an insight on what it’s going to be like.” These comments suggest that some students appreciated working autonomously in their placements.

One of the students mentioned the positive environment of her site as a major strength of the program. Student number two stated, “I got really lucky because my site is like it’s amazing.” One of the other interviewed students felt that the fact that the program matches students to sites to mirror their career interests was one of the greatest strengths of the program. Student number three commented, “I like the fact that they try to match you with a site that have people in the career that you want to be in.”

Weaknesses of the Program

When asked about any perceived weakness within the program, of those surveyed, 27% (see Table 12) stated they would not change anything about the experiential program. Thirty-nine percent of the students surveyed wanted to do more at their sites, and 15% wanted to see more medical related "stuff" at their sites.

Table 15

Student-Coded Questionnaire Responses about Weaknesses of the Program

Response	No. of Students	%
Wouldn't change anything	16	27
Want to see more medical-related stuff	9	15
Would like to help more	23	39
Opportunity to rotate sites	4	7
More welcoming professionals	3	5
Work more with patients	1	2

However, only one response from an interviewed student corroborated the coded data from the questionnaire about wanting "to see more" or "help more" to be a weakness of the experiential program. One student mentioned wanting to see more "medically-related stuff." Specifically, she stated wanting, "to see a baby being born" and wanting to help in the delivery room by passing out the necessary tools to the doctor. During the interview, this student mentioned assisting with "urine dips and UCGs" (Urine Chorionic Gonadotrophin—a hormone produced by the fertilized egg after conception) and scheduling patient appointments as a part of the tasks she did at her site. Her response indicates active engagement at the site—and her desire to do and see more—to be driven by interest rather than lack of engagement.

The other interview responses did not directly match responses from the survey data with

regard to weaknesses in the program, but did shed light on organizational aspects of the program that could be improved. For example, student number one wanted more time at her site; she liked her site but longed for more time to interact with the doctors and professionals at her site. This particular student had an hour of commute time, which interrupted her internship time; she wished to remain at her site longer. The school provided transportation to and from her site, but often ran into traffic, causing her to leave her site earlier than most. She did not want a different site; she valued the relationships and time she spent with the doctors at her site, mentioning that they often "give her advice about schools and options for medical school." This student continued to describe her interactions with various doctors at her site, and shared:

> Dr. F. and I, like we talked about all the places, I can go because I used to be so focused in going to UCLA . . . and Dr. D. who is like a father figure to me, he always gives me all this great advice.

Overall, she felt the only weakness of the program was the commute; she wished she had more time for additional interactions. Her feedback is important for school administrators who can consider an extended day for these students to ensure they have as much time as possible at their sites.

Other comments about the weaknesses of the program suggested that some students were less happy with their placements and, in particular, disliked the paperwork process necessary for placement assignments. For example, one student mentioned wanting a different site, and we discussed the possibility of rotating sites. As of 2013, some students were assigned as lab assistants and assigned to science teachers to aid in lab preparation and clean up. This student felt he was assigned as a lab assistant because of a misunderstanding with his paperwork, and had that not been the case, he believed he would be at another site. Student number four

described this situation to us: “When you’re in the 10th grade second semester, where they tell you about how to get your records done, the immunization records, they don’t really explain that well and that’s why I’m stuck at [Archard].” Another student mentioned confusion with the processing of paperwork and necessary vaccinations as a negative aspect of the program. Student number three stated, “All the paper work in the first two months that was unnecessary — hated it . . . Paperwork and the vaccinations.” These comments may prompt the administrators to examine the initial paperwork and find ways to scaffold its completion for students and parents to make it easier to complete.

Experiences with Communication and Technical Skills

Communication is a key aspect for successful networking and collaboration in any field. The skills obtained by students varied from site to site and depended on both student and adult interaction. Within the survey, students were given prompts about the types of communication skills they could be developing at their site and were provided a space to fill in any communication or technical skills not listed.

According to the responses of the students (N = 59) who participated in the survey (see Table 14), 63% of the students reported interaction with visitors and family members of patients at their site, and 56% reported working directly with patients helping them to feel comfortable. Of the students who reported the development of other communication skills (15%), the majority of students reported learning to communicate directly with doctors, nurses, or other professionals at their site as the skill they had developed. One student noted that she learned how to interact with mentally ill patients as the communication skill she developed at her site. Other communication-related tasks reported by students included clerical type work such as arranging

appointments (19%) and assisting with translation (24%).

Table 16

Student-Coded Questionnaire Responses about Communication Skills Developed

Response	%
I greet visitors and family members	63
I arrange and schedule appointments	19
I assist with translation	24
I work directly with patients helping them to feel comfortable	56
I work directly with children helping them to interact in developmentally appropriate ways	15
Other	15

In terms of technical skills developed at their sites, students selected from a list of skills provided and had the opportunity to write in additional skills not listed. Student responses indicated that 48% (see Table 17) of participants had learned to operate various machines within the hospital setting, and 41% indicated that they had learned how to take vital signs. Of the 24% of students who reported developing other technical skills 14% mentioned assisting with inventory or stocking; 21% mentioned learning to package or deliver medical equipment; 7% learned to count and chart teeth; 7% learned to process film and enter data; and 29% indicated being involved in filing or dealing with paperwork. Taken together, their responses indicate a wide range of technical experience at the various student assigned sites. This information is relevant to school administrators who would like to encourage greater exposure to STEM-related experiences at placements.

Table 17

Student-Coded Questionnaire Responses about Technical Skills Developed

Skill	%
I've learned CPR	27
I've learned how to take vital signs	41
I've learned how to operate various machines within the hospital setting	48
Other	24

School Program and Culture

The second research question asked about students' perceptions of the academic curriculum beyond the Hospital Careers Program to determine if the school curriculum was rigorous and supportive of student development toward a STEM career. The academic curriculum beyond the careers program was defined as student experiences in coursework (e.g., development of their communication and technical skills in their classes); types of coursework (e.g., access to advanced placement classes); and experiences with teachers (e.g., perception of teacher participation in school themes).

Communication and Technical Skills

Students were given a list of communication skills on the survey that they might be exposed to in their classes and asked to indicate which ones they encountered in their classes. A category labeled "Other" was offered, and students were given space to write in any communication skills they have developed that were not listed. (see Table 18)

Table 18

Student-Coded Questionnaire Responses about Communication Skills Developed

Communication Skills	%
I've made presentations to my teacher and class to communicate ideas	70
I've participated in group or partnered activities that require collaboration	86
I've created visual posters or displays to communicate ideas	75
I've been required to use media and technology to communicate ideas	70

All items related to communication scored higher than 50%, suggesting that students did gain communication experiences in their coursework. Of those students who responded (N = 59), 86% of the students indicated that they had participated in group or partnered activities that required them to collaborate and present ideas. Further, 75% indicated they had to create visual posters or displays to communicate ideas. No additional written responses were offered on the survey.

Similarly, students were given a list of technical skills that they could have been exposed to in their classes. These skills revolved around those they might have encountered in the biology and chemistry classes. (See Table 19) At Archard, biology was offered to all 9th-grade students and chemistry is offered to all 10th-grade students. Because participants were in their junior year, asking about biology and chemistry would provide data on their experiences previous to the experiential program. Students were also given the option of "Other" and the opportunity to write in any technical skills they may have acquired that was not listed.

Table 19

Student-Coded Questionnaire Responses about Technical Skills Developed at School

Technical Skills	%
I've used pipettes	66
I've used equipment associated with gel electrophoresis	25
I've used microscopes	64
I've used burettes	15
I've used tools for dissections	71
I've used probes and meters (pH, light, motion, etc.)	66
I've written lab reports to communicate my understanding of concepts	80

Of the technical skills listed, 80% of students reported experience with writing lab reports to communicate ideas; 71% reported having used tools for dissection; and 66% reported use of pipettes, pH probes, or other meters. These responses indicate the development of technical skills was encouraged by their coursework.

Scientific Literacy and Inquiry in the Classroom

Additionally, a composite that addresses the levels of scientific literacy and inquiry within classrooms was created to measure student experiences outside of the program. This composite was constructed on a 5-point Likert scale, with 1 representing *never* and 5 representing *always*. This composite had moderate reliability ($\alpha = 0.64$). Student responses (N = 56) supported previous responses about skills developed within the classroom. Students reported that labs were a regular part of their science curriculum in 9th and 10th grade ($M = 4.11$; $SD = .76$), with 74% of students reporting a 4 or higher, suggesting higher frequency of experiences. When asked about lab reports, 80% of students reported a 4 or higher, which supports previous responses about writing lab reports in class, and provides insight to the frequency that this occurs within the curriculum ($M = 4.18$; $SD = 1.06$). Students reported that reading scientific text was a frequent occurrence within their classes ($M = 3.95$; $SD = .98$), with 71% of students reporting a 4

or higher. When asked about whether they read scientific texts other than their science text book, 48% of students reported sometimes, and 25% reported with a 4 or higher (*M* = 2.98; *SD* = 1.05). Lastly, students were asked if they read scientific text in classes other than their science classes, and 49% of students reported sometimes, whereas 15% of students reported with a 4 or higher (*M* = 2.80; *SD* = 1.03).

1	*2*	*3*	*4*	*5*
Never	**Almost Never**	**Sometimes**	**Almost Always**	**Always**

Figure 3. Five-point Likert Scale used for inquiry and scientific literacy composite.
This scale represents that used to quantify student responses

Advanced Placement Classes

Taking advanced placement (AP) courses suggests students that have an interest in continuing their education beyond high school. However, research has noted that it is rare that low-income inner-city schools have a quality offering of AP classes (Hagedorn & Purnamasari, 2012; Ndura et al., 2003; Solorzano & Ornelas, 2004; Whalen & Shelly, 2010), and that minority students often do not take advantage of them when they are available (Constantine et al., 1998; Hagedorn & Purnamasari, 2012; Solorzano & Ornelas, 2004). To measure the experiences of students with the academic curriculum beyond the Hospital Careers Program, students were asked to indicate on the survey which AP courses they had enrolled in at Archard Medical Magnet High School (See Table 20).

Table 20

Percentage of Survey Participants Who Reported Participation in an AP Class

Course	%
AP English/Literature	46
AP Mathematics	7
AP Social Science	64
AP Science	58
AP World Language	9
AP Computers	0
AP Fine Art	0

More than half of the students who participated in this survey (N = 59) reported challenging themselves with an AP class in the social science and science disciplines. For example, 64% of the survey participants indicated having taken an AP class in the social sciences, and 58% of them indicated having tried an AP science class. More than half of them also reported trying AP classes in two or more disciplines. (see Table 11) These statistics indicate a strong college-going culture at Archard Medical Magnet High School.

Table 21

Percentage of Survey Participants to Have Tried an AP Class

Effort Level	%
Students who have never tried an AP class	14
Students who have tried an AP class in 1 discipline	14
Students who have tried an AP class in 2 disciplines	27
Students who have tried an AP class in 3 disciplines	27
Students who have tried an AP class in 4 disciplines	09

Teacher Participation in STEM Themes

Finally, students were asked about their perceptions of teacher participation in the annual school theme. In addition to the medicine and science careers program, the school implemented

yearly themes to give all students exposure to various options within medicine and science. For example, the theme two years previously (participants' freshman year) was global health. Their sophomore year, the school theme was holistic health and the 2013 theme was building bridges. Participants in their junior year should have experienced all three of these themes to some extent. Teacher participation was voluntary and resulted in varied, rather than targeted, exposure. Understanding students' perceptions of their teachers' participation in the theme shed light on their experiences outside of the careers program. Student responses indicated a gradual decline in teacher participation. (see Figure 4)

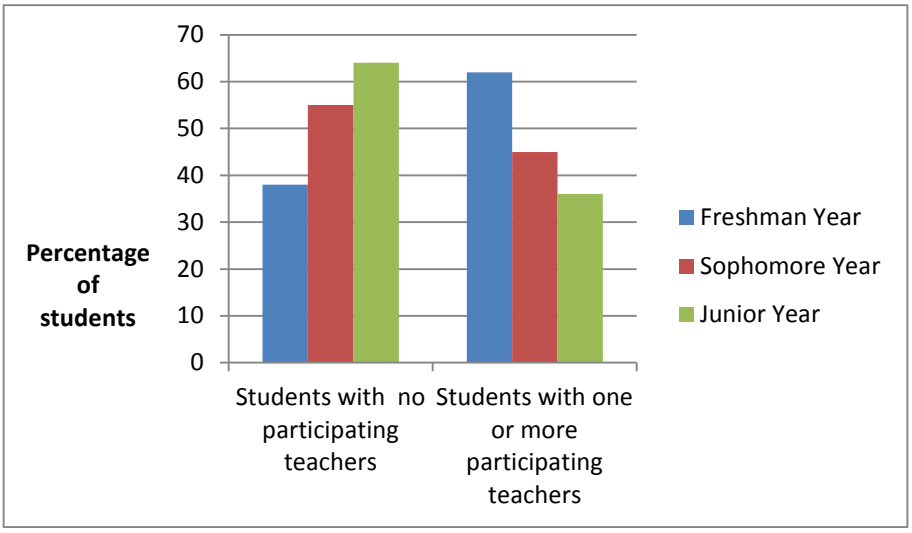

Figure 4. Student perception of teacher participation in yearly school themes.
This graph shows how many students (in percentages) reported having no teachers participating in the yearly theme and how many students reported having one or more teachers participating in the yearly themes.

The data indicate that students perceived a decline in teacher participation revolving around the yearly school theme. These themes were designed to broaden student exposure to medicine- and science-related fields and to provide a central focus for all disciplines. A decline in teacher participation represents a missed opportunity to engage in thematic and interdisciplinary instruction.

Overall, outside the careers program, students were developing their communication skills: they are being encouraged to present their ideas and findings, work collaboratively with others, and make use of technology and creating visuals to express their ideas. Students will need these communication skills to maneuver successfully in any postsecondary field. Technical skills were also being encouraged, which would provide students with a strong science background. The scientific literacy and inquiry data suggest development of scientific skills. Unfortunately, the school theme data indicate varied support by teachers of the STEM-related themes in classes other than science. Still, the findings suggest students have a variety of AP classes to choose from and many are taking advantage of the opportunity to do so.

Occupational Identity, Access, and Career Maturity

The third research question aimed to determine the occupational identity, access through self-advocacy, and career maturity for low SES Black and Latino students participating in the experiential Hospital Careers Program. As such, these variables were measured through items on the survey and also asked of students during the interviews. Findings are presented below by variable.

Occupational Identity

To determine the occupational identity of students in the careers program, students were

asked to respond to questions taken from the EOME-2 (Bennion & Adams, 1986). Two subscales of Occupational Identity emerged: Foreclosure and Consideration. An individual is considered to be in a state of identity foreclosure when they decide to pursue the career that someone else chooses for them (usually their parents) (Marcia, 2002). Consideration, however, involves exploration or research into interests, or what careers would match their personal ability and skill set when trying to determine which careers are right for them.

The Identity Foreclosure composite was measured on a 6-point Likert scale, in which 1was *strongly disagree* and 6 was *strongly agree*. Ideal responses to Foreclosure items would be lower to indicate that students disagree to these items. On average, students scored a mean of 2.18 (*SD* = 1.08) on this subscale, suggesting disagreement. For this composite, students were asked to respond to statements like: “I haven’t chosen the occupation I really want to get into and I will probably work at whatever is available until something better comes along”; and “My parents decided a long time ago what I should go into for employment and I’m following through with their plans.” As students approach the end of their high school career and after one semester in the experiential Hospital Careers Program, it is the hope that students would have chosen a career path or direction. A mean of 2.18 indicates that most students in this population (N = 59) disagreed with the statements and were not in a state of foreclosure when it comes to occupational identity.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	**Moderately Disagree**	**Disagree**	**Agree**	**Moderately Agree**	**Strongly Agree**

Figure 5. Six-point Likert scale used for occupational identity composite.
This 6-point Likert scale was used by students to report their Occupational Identity and by the PI to measure and analyze student responses.

The second identity subscale, Consideration, referenced students taking their time and contemplating their future career directions before deciding on a path. The desired response to indicate Consideration would be greater agreement with these items. Students with a strong occupational identity should have taken time to come to a career path and have not whimsically chosen a path. Of the students who responded to the questionnaire (N = 59), 67% responded within the, *agree* to *strongly agree* scales. The high mean score on the composite further suggests that students were in more agreement on these items (M = 4.12; SD = 1.22). These responses indicate that, on average, students within the careers program have given ample consideration to their career choices. Taken together, the findings for both subscales indicate that students within the careers program had a strong sense of identity around occupation.

Whereas the survey items suggest that participants in the Hospital Careers Program have a strong sense of occupational identity, this variable was also measured via interviews. Students were asked about the career they would like to pursue, their level of certainty about their stated career that they would like to pursue, and what type of things they were currently doing to make their career aspirations a reality. The stages of occupational identity as defined by Malanchuck and colleagues were then applied as the coding scheme to analyze the interview responses.

Specifically, this matrix includes five possible states of occupational identity: (a) integrated, (b) supported, (c) clarified, (d) conflicted, or (e) vague.

An individual's state of occupational identity is dependent on the extent to which he or she has set occupational goals, his or her expressed levels of desire and interest to attain those goals and the actions he or she is taking to support their occupational goals. The findings of the survey and the interview data both show higher levels of occupational development; however the interview data give additional insight to the levels of variation that exist within the occupational identity of minority students.

For example, when asked about the occupation she would like to pursue, student number one listed several different careers as a possibility, including being interested in: cardiac medicine, oncology or gynecology. She was certain that she intended to pursue a career in medicine, but she was less certain about the specific type of occupation within the medical field. During the interview she stated "I'd love to go into the medical field. Recently, I recently changed from wanting to do cardiac, to oncology to gynecology but I'm probably back to oncology again so." Based on her response, this student would fall into Malanchuks's clarified category related to her occupational goals. Although she entertained several occupational options, they were all within the same career path and were not conflicting or in opposition to each other. Still her response was not yet clearly defined, limiting her from being categorized as integrated.

When asked to rate her certainty on a scale of 1 to 10 that a career in medicine was right for her, she rated her certainty to be a 10. Having applied to the Hospital Careers Program to gain insight to the medical field, and according to her reported conversations with several

doctors at her site for advice and guidance, it would appear that she also had a strong interest and desire to obtain her occupational goals. Based on this evidence, student number one falls into the supported category in her interest and desire to attain her goals.

When asked about the actions she was currently taking to make a career in medicine a reality, she stated: “Well, for right now, I have pretty much all grades . . . I [am interested] in going to UCLA and UCLA med-school and eventually working at UCLA.” She was challenging herself with AP courses and planned on taking AP courses the next year as well. Based on the actions she was taking in support of her future career goals, she would fall into the supported category for actions that supported her goals because she was actively planning and putting forth efforts to make her career goals a reality.

Use of the matrix places student one somewhere between supported and clarified in terms of her overall Occupational Identity development.

Student #1							
Occupational Identity Criteria	**Integrated**	**Supported**		**Clarified**	**Conflicted**	**Vague**	
Occupational Goals	Clearly Defined	Clearly Defined		Defined goal	Unclear goals (more than one goal, conflicting and in opposition)	Vague Goal	No goal
Desire/ Interest to attain goals	Strong desire and interest	Strong desire and interest	No true desire or interest	Strong interest	Dream like interest	No strong interest	
Actions that support goals	Active planning and effort put into achieving goals	No planning or effort to achieve goals	Active planning and effort put into achieving goals	No planning or effort to achieve goals	No planning or effort to achieve goals	No planning or effort to achieve goals	

Figure 6. Occupational Identity Matrix for Student 1.
This figure represents the levels achieved by student one in relation to her Occupational Identity development.

Student number two was also Black/African American and was of Nigerian decent. When asked about her future career aspirations, she was certain she wanted to become an obstetrician/gynecologist. This student's responses demonstrated a solid occupational identity in terms of occupational *goals.* Specifically, student number two also expressed a strong interest and desire to achieve her occupational goals. When asked to rank her certainty on a scale of 1 to 10, she stated, "Well I don't give anything a 10 except for food, so I give it like an 8.5, 8.5-9." Based on this response, student number two fell into the integrated category for *desire and interest* to achieve her occupational goal.

When asked about what *actions* she was taking to make becoming an obstetrician/

gynecologist a reality, she mentioned enrollment in AP classes and strategically planning to take physics and AP English the next year because felt those classes would best prepare her to do well in college. In her words:

> Well, the classes I'm taking next year, [are] sort of geared towards medical school, like I'm not taking random stuff like AP Environmental that's not pertaining to what I'm trying to do. I have AP Physics . . . and then AP Calculus 'cause you just need calculus and . . .AP Lit because you know you gotta write stuff in college regardless of what you're trying to do.

Based on her combined responses, student number two clearly falls into the integrated category in all aspects of her occupational identity.

Student #2							
Occupational Identity Criteria	**Integrated**	**Supported**		**Clarified**	**Conflicted**	**Vague**	
Occupational Goals	Clearly Defined	Clearly Defined		Defined goal	Unclear goals (more than one goal, conflicting and in opposition)	Vague Goal	No goal
Desire/ Interest to attain goals	Strong desire and interest	Strong desire and interest	No true desire or interest	Strong interest	Dream like interest	No strong interest	
Actions that support goals	Active planning and effort	No planning or effort to achieve goals	Active planning and effort put into achieving goals	No planning or effort to achieve goals	No planning or effort to achieve goals	No planning or effort to achieve goals	

Figure 7 .Occupational Identity Matrix for Student 2.
This figure represents the levels achieved by student two in terms of her Occupational Identity development.

Student three was female and also Black/African American—of Afro-Caribbean and African American decent. She reported interest in pursuing a career as a child psychiatrist. When asked to rate her certainty on a scale of 1 to 10 that that career was the one she would like to

pursue, she responded, “23!” to indicate that she was more than sure that it was the career she wanted to pursue.

> *Researcher: Okay. Um On a scale of 1-10 how sure are you that this is the career child psychiatry is the career you’d like to pursue?*
>
> Student Number 3*:* 23!
>
> *Researcher: On a scale of 1-10*
>
> Student Number 3*:* mmhm [Yes]

When asked about things she was currently doing that would support attaining her future goals, she mentioned that she was challenging herself with AP classes and was registered to take AP psychology the next year. Based on her clearly defined career *goal,* her strong *interest and desire,* and her *active planning and efforts,* student number three displayed an integrated occupational identity.

Student #3							
Occupational Identity Criteria	**Integrated**	**Supported**		**Clarified**	**Conflicted**	**Vague**	
Occupational Goals	Clearly Defined	Clearly Defined		Defined goal	Unclear goals (more than one goal, conflicting and in opposition)	Vague Goal	No goal
Desire/ Interest to attain goals	Strong desire and interest	Strong desire and interest	No true desire or interest	Strong interest	Dream like interest	No strong interest	
Actions that support goals	Active planning and effort	No planning or effort to achieve goals	Active planning and effort put into achieving goals	No planning or effort to achieve goals	No planning or effort to achieve goals	No planning or effort to achieve goals	

Figure 8.Occupational Identity Matrix for Student 3.
This figure represents the levels achieved by student three in terms of their Occupational Identity development.

Student four was an African American male. He was undecided about which career path he would like to pursue. When asked if there was any career that he might consider, he responded: “Not in the science field, but an electrician, something like that, something with the hands.”

When asked about people he talked to when seeking advice about his future career, the following conversation ensued:

> *Researcher: Have you talked to anyone about your future career plans, like about becoming an electrician or doing things with your hands?*
>
> Student Number Four*:* Well my parents and then I have a college counselor that comes to my house . . . stuff like that.
>
> *Researcher: Okay, and what have you heard from them? What kind of input have they given you?*
>
> Student Number Four*:* Well, they say it’s up to me. But the college counselor, she’s been giving me ideas about apprenticeships and stuff like that.
>
> *Researcher*: *Have the conversations helped you?*
>
> Student Number Four: Yea, cause without them I would have no idea what I want to do.

The college counselor who came to his home had mentioned the possibility of an apprenticeship or some sort of on the job training for becoming an electrician. He was enrolled in an AP class and was confident that he would apply to junior college, but did not think that he would like to attend a 4-year college. Based on these responses student number four would fall into the vague category for his occupational *goal*, as he was undecided about what he would like to do and the options available to him.

When asked to rank the possibility of becoming an electrician on a scale of 1 to 10, he gave it a four. Based on the ranking of his current career choice—which did not indicate a strong

interest–he also fell into the vague category for his desire and interest to attain his stated occupational goal.

In short, student number four was unsure about his future educational plans and future career goals. He mentioned entertaining the idea of an apprenticeship; the following is what student number four had to say:

> Well I learned about the process in which you go through, [and] it's not college, I don't know. I don't have plans to go to college, but it's still open. . . . Well, I'm definitely going to a two year [college] — I'm talking about a four year [college], I don't know about that.

When he spoke to an electrician he received the following information: "He said how he went to an apprenticeship and . . . it's like a five year program and he's doing that now."

Student four believed his goal could be achieved through on-the-job-training, which is most likely to occur post high school. When asked what steps he was currently taking to support the attainment of a future career, student four stated: "Well…my grades is one and then I'm researching some stuff to see what I want to be what are some steps."

Based on these responses, student four falls into the vague category for his *actions* and support for career attainment. Together, all of his responses classify him as vague for his overall occupational identity development. Though he is currently classified as vague, the following is what the student had to say about the effect of the hospital career program on his occupational identity:

> Well it's [a career in medicine and science] something that I don't want to do. . . . So that's for sure, like certain kinds of Doctors have to check stuff and certain smells and stuff like that yea, I can't do that.

He reported that he was actively researching various careers and the steps to achieving them so that he could figure out which would be right for him.

Student #4							
Occupational Identity Criteria	**Integrated**	**Supported**		**Clarified**	**Conflicted**	**Vague**	
Occupational Goals	Clearly Defined	Clearly Defined		Defined goal	Unclear goals (more than one goal, conflicting and in opposition)	Vague Goal	No goal
Desire/ Interest to attain goals	Strong desire and interest	Strong desire and interest	No true desire or interest	Strong interest	Dream like interest	No strong interest	
Actions that support goals	Active planning and effort	No planning or effort to achieve goals	Active planning and effort put into achieving goals	No planning or effort to achieve goals	No planning or effort to achieve goals	No planning or effort to achieve goals	

Figure 9. Occupational Identity Matrix for Student 4.
This figure represents the levels achieved by student four in terms of his Occupational Identity development.

Student five was an African American female. Unlike the other students, she was most interested in pursuing a non-STEM career in the performing arts. When asked about her career goals, she had the following to say:

> I would like to be in the performing arts more so than . . . the medical field. The medical field is like a plan B , so I can have . . . just in case the performing arts don't work out for me, I can have something to back up which is medical and I would like to be an OBGYN doctor if it doesn't work out.

Based on this response, she falls into the clarified and conflicted category for occupational *goals* because—though she clearly wanted to pursue a career in the performing arts—she also mentioned wanting to become an obstetrician/gynecologist (OBGYN) and felt she could achieve both. These two career paths are conflicting and in opposition to each other.

When asked to rank her career interest on a scale of 1 to 10, she gave performing arts a

10 and an obstetrician/gynecologist an 8. Ranking both paths highly indicate a strong interest in both fields. As such, she is categorized as clarified for her *desire and interest* to obtain her goals. Although she was not challenging herself with any AP courses that might be helpful in preparing her for the rigors of college, she mentioned several things that would support a career in performing arts, such as a having voice coach, taking acting lessons, and returning to dance class and dance lessons. When asked about the steps she was taking to make a career in performing arts a reality, she responded:

> I am starting to . . . in the summer I am doing photo shoots now, and I'm getting a voice coach cause I like to sing, and I'm starting back dancing, because I like to dance I used to dance but now I'm starting back and I have an acting coach.

Her comment indicates that she is in the supported category due to her *active* planning and efforts toward attaining her career goals. When asked about the role the careers program played in helping her come to her decision, she had this to say:

> It kinda did . . . but I already knew what I wanted to do so it just gave me an open mind of how if it doesn't work out [a career in the performing arts] . . .how the medical field would be if I go into it, which I do want to . . . I want to do both, I can do both if I put my mind to it. So it kinda of help me figure [it]out.

Based on her responses, student five spans three categories (from supported to conflicted) of occupational identity development.

Student 5							
Occupational Identity Criteria	**Integrated**	**Supported**		**Clarified**	**Conflicted**	**Vague**	
Occupational Goals	Clearly Defined	Clearly Defined		Defined goal	Unclear goals (more than one goal, conflicting and in opposition)	Vague Goal	No goal
Desire/ Interest to attain goals	Strong desire and interest	Strong desire and interest	No true desire or interest	Strong interest	Dream like interest	No strong interest	
Actions that support goals	Active planning and effort	No planning or effort to achieve goals	Active planning and effort put into achieving goals	No planning or effort to achieve goals	No planning or effort to achieve goals	No planning or effort to achieve goals	

Figure 10. Occupational Identity Matrix for Student 5.
This figure represents the states achieved for student number five in terms of Occupational Identity development.

Across the participants, the quantitative data indicate that students in the careers program display positive occupational identity development in terms of Foreclosure and Consideration. The data indicate variance across surveyed participants (Consideration: *SD* = 1.22; Foreclosure: *SD* = 1.08), frequencies indicated that more students reported the desired responses that display positive levels of occupational identity (less Foreclosure and more Consideration). The qualitative data also support student identity development for occupational Consideration. Students were clearly contemplating their career choices and trying to determine what their most appropriate next steps are. Even the student who was classified as vague demonstrated contemplation in sharing that now he knew, in his words, “It’s (a career in medicine or science) something that I don’t want to do.”

In terms of occupational identity measured by *goals*, *interests*, and *actions* on the

Malanchuk matrix, the qualitative data indicated that students were in various places. Two of the five interviewed students demonstrated fully integrated occupational identities and two spanned more than one category of occupational identity development. These students were taking actions to continue to move toward having an integrated state of occupational identity development. Even though it is not evidenced by the Malanchuk matrix, one student in the vague state of identity development was much more evolved in his quest, having gone through the program and realized that medicine and science was not the field for him.

Access

The level of student access to STEM fields was defined as seeking advice from others about one's career. For the access composite, students were asked to respond to questions on a 6- point Likert scale with 1 representing *Almost Never* and 6 representing *Almost Every Day*. The composite of access had a mean of 3.66 (*SD* = 1.11) on this 6-point scale, indicating that students were having conversations monthly, if not weekly, about their future career goals and plans. When individual frequencies were run, student responses indicated they spoke to their parents and friends about their educational and career goals more often than with their teachers or counselors.

1	*2*	*3*	*4*	*5*	*6*
Almost Never	**< Once a month**	**1 – 3 times a month**	**Once a week**	**A few times a week**	**Almost everyday**

Figure 11. The six-point Likert scale used for the access composite.
This figure represents the six-point Likert scale used for the access composite.

Specifically, when asked about how often they spoke with their friends about education

after high school, of those who responded to the question (N = 59), 66% reported speaking to their friends once a week or more. When asked how often they spoke with their friends about future jobs or careers, of those who responded to the question (N = 57), 69% reported speaking with their friends once a week or more. Similarly, when asked about how often they spoke to their parents/guardians about education after high school, 75% of the students spoke to their parents once a week or more about their plans for education after high school. When asked to respond to how often they spoke with their parents/guardians about future career plans, student responses (N = 59) indicated that 52% spoke to their parents once a week or more.

When it came to teachers and counselors, in terms of education, students' responses (N = 59) were on the other end of the spectrum, with 32% of students indicating that they almost never spoke with their teachers about education after high school, and 46% indicating that they spoke to their teaches one to three times a month or less. Similar trends were seen when asked about speaking with their teachers or counselors about future career plans. Of those who responded (N = 58), 41% indicated that they almost never spoke with teachers or counselors about career plans, and 41% that they spoke with teachers and counselors once a month or less. From these findings about access, students seemed to turn to their parents and friends about their education after high school and their future careers more so than to their teachers and counselors.

On the questionnaire, students were also asked to respond to an open-ended question that asked, "Who do you go to for career advice?" Their responses were recorded and coded to identify emergent themes. (See Table 22) Responses from the questionnaire displayed variety and resourcefulness. Family—meaning parents and relatives other than parents—made up 44% of those whom students accessed for information about education and future careers. Family

represents the largest group to emerge and support the findings presented above for the access composite. Friends, on the other hand, made up only 3% of student responses; this finding counters findings of the access composite. Teachers and on-site counselors combined made up 18% of those whom students go to about their future education and career.

Table 22

Recorded and Coded Open-Ended Access Responses from the Questionnaire

Individuals consulted by students	No. of Students	%
Adults	2	3
No one	3	5
Relatives other than parents	13	22
The internet	7	12
Parents	19	32
Friends	02	03
Teachers	10	17
College/School counselor	5	8
Off-campus counselors and mentors	7	12
People with careers	6	10
Friends in college	1	2
Anyone	1	2
Did not respond	3	5

As evident from the data above, students sought advice and had access to trusted adults such as parents, teachers, and other family members for career-related questions. What is less certain, however, is the extent to which the students perceived that advice as helpful. The interview data, however, provided some insight to those conversations, the individuals they have access to, and their levels of self-advocacy in seeking out advice that was meaningful to them.

During student interviews, participants were also asked about whom they go to for career advice. Their responses were recorded and coded to identify trends and emergent themes within

student responses. Specifically, 4 out of 5 students indicated that they spoke to their parents about their career goals; of those, 2 students indicated that the conversations did not always provide guidance and direction. For example, student number one shared, "[I've spoken to] my parents but like I haven't really like told them in exact words what I want to do. . . . They're not really too concerned with what I want to be when I grow up." Student number two said:

> I don't take into consideration what my parents have to say about what I should do with my life . . . they kinda raised me in that Les-a-faire way. You know . . . independent do your own stuff (and) see how you turn out way... they wanted me to go into Law because they believe that would be a good fit for me – and for a while I thought it was too – but then I realized that's not for me.

Student four also indicated that he spoke to his parents about his career goal and thought those conversations were helpful, saying "Without them I would have no idea what I want to do." However this student was undecided in his career goal and was still exploring his options.

All five students interviewed said they had spoken to professionals within their interested fields about their future career goals; 3 of those students encountered these professionals at their site. One made use of family members who were not her parents, and 2 out of 5 made use of individuals (counselors and professionals) outside the school network.

The interviews indicated that the careers program was successful in providing students with access to career professionals who were able to give guidance on steps to take and possible paths to follow. Students in the careers program gained insight and information through their conversations and interactions with these professionals at their sites. Some students had access to outside resources; other students happened on the professionals by chance. Conversations with parents about education and future careers—though indicated as occurring frequently by the access composite—may be more about encouragement than actual guidance, as indicated by the

interview responses.

Career Maturity

Career Maturity was defined in this study by using a measure created and field-tested by Crites and Savickas (1996). This measure is made up of four subscales: (a) concern, (b) curiosity, (c) Confidence, and (d) consultation. Because of low internal reliability, the subscales of concern and consultation were removed. Career maturity for this group of participants was only measured in terms of their curiosity and confidence, but findings about students' overall career maturity were corroborated by interview data and other aspects of the survey.

Curiosity

Curiosity in multiple career options is a healthy aspect of exploration and necessary before one decides on a career path. Exploration of options is often limited for minority students due to circumstances, such as lack of access to a network of professionals in various careers. Students were asked to respond to statements like: "I know very little about the requirements of jobs"; and "I don't know how to go about getting into the kind of work I want to do." For this subscale, the minimum value attainable was 6, and the maximum value attainable was 12. Of the participants surveyed (N = 58), 64% achieved a score of 10 or higher on the curiosity subscale, indicating that they had a high level of maturity and knew how to access information about various types of jobs and careers in which they were interested.

To address the curiosity subscale within the interviews, students were asked about how they had become interested in their current career choice. Four out of 5 expressed how aspects of their career choice matched their ability, disposition, or passion, and referred to a particular experience that had solidified the career choice for them. One out of 5 expressed that the

educational path for the career (which does not require a 4-year college degree) had spurred his interest in the field. Below are excerpts from student interviews.

Student number three expressed the root of her interest with the following statement: "I like babies. And I like psychology . . . . a psychiatrist makes more money than a psychologist, and I also wanted to be a Doctor but I don't like blood and stuff like that so –Psychiatry." For this student, a career within the medical field that combined the things she liked: children and psychology, and was void of the things she did not like about the medical field, like blood. Together, these qualities pointed her in the direction of becoming a child psychiatrist.

Student number five shared:

> My mom said, I used to when I was little, I always danced , I love dancing . . . And signing just fell along with it because singing kinda runs in my family, My mom sings, ..And then I went to a school called CCA that's the initials for it but it's Community Christian Academy and they had, they had a choir there and we had to join the choir, you had to - it wasn't no ifs-ands-or-buts - you just had to be in the choir. And that's what really brought my voice out. So that yeah all those things helped and that's how I knew just wanted to do it [be a performer].

Student number five believed that she had always had the disposition of a performer. She had experimented with a couple aspects of the performing arts, such as dancing and singing. Her experience in the choir at the private school she attended previously had encouraged her to grow as a singer and solidified that this career was the one she would like to pursue.

Student number two shared that participating in an outside program prior to being in the Hospital Careers Program had spurred her career interest:

> They had this OBGYN there and I was talking to her . . . [and] I liked what she had to say about it I think it's a nice fit for me . . . She said what attracted her [to being an Obstetrician/Gynecologist] it was family medicine. It was not just the mother it's the children too so it was [inclusive], and I like that, you get see all of them you know.

She credited her experience within the Hospital Careers Program for solidifying her career

choice, saying, "(The Hospital Careers Program) made me more interested in medicine, like that atmosphere, I don't know, the healing and then all the dying, I don't know . . . I like it." From this response, student number two revealed that she could handle the ups and downs of being in the hospital environment and felt even more strongly that this career was the right path for her.

Student number one described how she had become interested in pursuing a career in medicine and science:

> Many different things happened, but I think the thing that made it concrete was I was in the GATE program at my school and we were dissecting a lamb's heart and I actually got really into it because I'd learned all the valves and the four chambers and all that other stuff, and I brought it home and . . . .I told my mom we needed to keep it and I put it in a jar . . . that was just how I knew I just wanted to be in the medical filed because it really interest me.

Student number one had an experience within her previous school setting that had ignited her interest and pointed her toward a career in medicine and science.

Student number four based his career choice on the fact that it did not require a college degree, because he didn't feel he would do well at a 4-year college. He described this idea in the excerpt below:

> *Researcher: How did you become interested in becoming an electrician?*
>
> Student #4: Well I learned about the process in which you go through, it's not college, I don't know. I don't have plans to go to college, but it's still open. So yeah.
>
> *Researcher: Now I happen to know you're in advanced biology and you seem to be doing well . . . this semester.*
>
> Student #4: This semester.
>
> *Researcher: with it– and so you don't think you'd do well in a college setting?*
>
> Student #4: For four years I don't think I'd do well.

Researcher: No? Why not?

Student #4: It's such a long time I think I'd get lost.

For student number four, his interest in becoming an electrician stemmed from a career path that does not require a 4-year college degree. Though he stated previously that he would definitely attend a 2-year college, for the time being, he was only entertaining options that did not require a 4-year degree.

Four out of 5 students had an idea of what they wanted to do before they were a part of the campus or the Hospital Careers Program. For 4 out of the 5 students, their career choice was already grounded in previous experiences they had had. The program served to confirm and, in some cases, eliminate medicine and science as a possible career choice. This finding supports the quantitative data that point to students in the Hospital Careers Program demonstrating career maturity through levels of interest and curiosity supported by experiences.

Confidence

Students were asked to respond to prompts such as, "I have so many interests that it is hard to choose just one occupation"; and "I keep changing my occupational choice." For the composite of confidence, the minimum possible value attainable was a 6 and the maximum attainable a 12. Based on student responses (N = 58), 48% surveyed achieved a score of 10 or higher. Student confidence and certainty about their career choice appears to be lower than their curiosity but still demonstrates a mature state.

Within student interviews, students were asked to rank on a scale of 1 to 10 how sure they were that their current career choice would be the one they would pursue. These responses

are also an indicator of confidence. Four out of 5 students reported a score of 8 or higher, indicating high levels of confidence. One student reported a score that fell below 5, indicating low levels of confidence in his career choice. These rankings support the quantitative findings and point to students in the careers program having high levels of career maturity surrounding confidence.

CHAPTER FIVE

DISCUSSION AND IMPLICATIONS

Low socioeconomic status children, a group comprised mostly of Black and Latino youth, have limited access and exposure to STEM fields. This limited access begins with a social network that often does not include individuals within the STEM fields and is compounded by K–12 preparation that lacks rigor (Constantine et al., 1998; Hagedorn & Purnamasari, 2012; Ndura et al., 2003; Solorzano & Ornelas, 2004; Whalen & Shelly, 2010), provides limited or no access to AP courses (Hagedorn & Purnamasari, 2012; Ndura et al., 2003; Solorzano & Ornelas, 2004; Whalen & Shelly, 2010), and yields low levels of scientific and technological literacy (National Research Council, 2007). These foundational issues diminish the ability of minorities to contribute to the larger society through STEM fields (Ndura et al., 2003) and pose a social justice issue of fairness and access for these students. The ability to develop a functional occupational identity, one grounded in the ability and interest of students, has the potential to transform the socioeconomic status of low SES students. For students who lack the network to develop along the lines of STEM fields, intervention must come from elsewhere. Schools have the potential to provide tools for intervention through an experiential curriculum.

The purpose of this project was to examine the influence of an experiential curriculum at a STEM-themed magnet on low socioeconomic minority youth as well as its value to expose minorities to a career fields in which they are underrepresented. This study also looked at the curriculum of a magnet school outside of the experiential program and the state of the

occupational identity, access through self-advocacy, and career maturity of minority students enrolled in the experiential program. Three research questions were posed in this study:

1. What are the experiences of students within the Hospital Careers Program, an experiential curriculum, at Archard Medical Magnet High School?
    1.1 What are the strengths and weaknesses associated with the experiential program through the eyes of the students?
2. Does the academic curriculum outside of the careers program support the development of students?
3. What is the state of occupational identity, access through self-advocacy, and career maturity for low SES Black and Latino students who are participating in the hospital careers experiential curriculum at Archard Medical Magnet High School?

To answer these questions, participants, who were junior students currently enrolled in the experiential careers program at a STEM-themed magnet high school, completed a survey and participated in interviews. Due to the limited number of studies that address magnet programs, as well as the limited number that addresses the occupational identity development of low SES minority students, this study contributes to the gap in the central body of knowledge. Still, some limitations affect generalizability of this study; those include small sample size and the study's minority focus. However, the minority focus was deliberate to allow the voice of these underrepresented students to be heard and to document ways that could support the development of this group as an untapped resource for STEM fields.

The focus of this study was on occupational identity for students who have limited access to STEM fields. As such, the work of Erickson (1968, 1985), Marcia (1993, 2002), and

Malanchuk et al. (2010) was relevant as all of it discusses the development of adolescent identity—including the beginning of occupational identity development, which was noted to occur in the middle school years. These theoretical understandings informed the creation of the survey and interview questions and provided the foundation for interpreting the findings of this study. For example, most students in this study already had stagnant ideas about the career field they were interested in pursuing; the majority was interested in a STEM-related career. This stagnant stance is supported by the literature and suggests that their occupational development began prior to the time of this study. Furthermore, the categories of expressed career interest provided by students in this sample countered those noted to be high for minorities in the literature. For example, students did not express wanting to become professional athletes or pursue a career in law enforcement. Only one of the interviewed students mentioned a career in entertainment, but was taking legitimate steps toward achieving that goal. Taken together, the findings will be interpreted through the lens of occupational identity development, informed by Erickson (1968, 1985), Marcia (1993, 2002), and Malanchuk et al. (2010).

The literature on experiential learning theory highlights how the theory can be appropriately applied to a range of fields like medicine (Abdulwahed & Nagy, 2009; Kolb & Kolb, 2009; Messersmith et al., 2008) and career development (Atkinson & Murrell, 1988; Chisholm et al., 2009). In the current study, the Archard Hospital Careers Program was evaluated; in this program, students participate in internship-like experiences in medicine- and science-related fields. Experiential learning theory is at the core of the curriculum used in the Archard Hospital Careers Program. This curriculum allows students to be reflective about their career options and develop their identities around possible occupations. As such, experiential

learning theory was examined through student feedback on the Hospital Careers Program curriculum and findings support the development of access to STEM experiences for low SES minority youth.

Finally, the notion of access and social justice are addressed in this study. This study attempted to understand students' experiences in a curriculum that is designed to address social justice issues, which assert that individuals should have the right to the pursuit of their own version "social primary goods" (North, 2006, p. 512). These include access to employment, education, and decision-making opportunities. Through the Hospital Careers Program and its experiential curriculum, minorities are being exposed to careers and fields outside of their social sphere and are given the opportunity to transform their current circumstances.

Findings

Research Question 1

Research question number one sought to uncover the experiences of students within the Hospital Careers Program. Findings suggest that student interest in STEM fields was present among this sample of junior students and showed little variation as represented by reported levels of interest before and during the experiential program. Students reported access and exposure to STEM-related fields as being among the biggest strengths of the experiential program. Students also praised the development of communication and technical skills specific to medicine and science-related fields through their experience in the experiential program. It appears that the use of experiential learning theory, which drove the program, worked to effectively increase access and exposure for the Black and Latino students in the study.

Interest in STEM careers. Upon entering Archard, students already had ideas about the careers they wished to pursue. Two-thirds of them expressed interest in a career in medicine and science. After a semester in the Hospital Careers Program, approximately two-thirds of the students still expressed such interest. This finding indicates that the experiential program worked to support student development toward STEM fields for those who expressed interest. Some of the students indicated being undecided about their future career path in the 9th grade; but when they were juniors, those numbers decreased. Specifically, during his interview, student four expressed that though he was still undecided about his career goal; his experience in the hospital program helped him rule out medicine as a future career option. This finding support occupational identity development even for students not interested in the pursuit of medicine- and science-related careers. This realization can have positive influence on retention and attrition rates in the postsecondary arena because this kind of exposure can prevent "false starts" or situations in which students begin a course of study only to find out much latter that their interest lies elsewhere.

Experiential program strengths. The biggest strength of the program mentioned by students was access and exposure. For some students, the strength was access and exposure to a field in which they were interested; for others, the strength was access and exposure to a field they never knew existed. Still, for others it was the hands-on access and exposure the program provided, which they would not have experienced elsewhere. This finding was corroborated by the quantitative and qualitative data, and suggests that the experiential program is working to provide access and exposure for students, who recognize and value these elements of the program. Taken together, this finding suggests that the experiential curriculum leads to access

within STEM fields for low SES students—an issue noted in the literature by Phillips and Pittman (2003), who have explained, “Limitations …associated with chronic poverty” affect the opportunity of individuals to explore, causing an “inhibiting effect on exploration” (Phillips & Pittman, 2003 p.123) This experiential curriculum counters this notion for low SES minority students by affording them greater exposure to possible careers.

Experiences with communication and technical skills at their sites. Student responses indicated that they were learning how to communicate with adults in positive and meaningful ways within a professional setting. Students were also developing entry-level skills specific to medicine and science careers, which allows them to better envision themselves within the field and determine which role they see themselves in for the future. The access and support provided by the experiential program lays a foundation for occupational identity development and higher levels of career maturity that counter foreclosure (Marcia, 2002; Phillips & Pittman, 2003). Students can begin working toward their career goals based on concrete experiences rather than on whimsical or idealistic perceptions outside of their abilities.

Research Question 2

The aim of research question number two was to determine if the academic curriculum outside of the Hospital Careers Program supported student development in a way that would increase their skills and potential for success within STEM fields. Findings suggest that for this sample of junior students in the experiential program, the overall curriculum at Archard Medical Magnet High School was supportive of the development of skills that mimic the scientific community as well as skills necessary to being successful academically in STEM-related fields. The academic curriculum includes access to AP classes, and the development of scientific

literacy and technical skills. These offerings prepare students for the challenges of pursuing a degree within STEM fields (Hagedorn & Purnamasari, 2012; Whalen & Shelley, 2010).

School program and culture. In a STEM-themed magnet school, several elements of the curriculum are essential to properly equipping students for success. As such, it is important to review the details of the program to determine if—beyond the experiential curriculum—it contributes to greater interest and access to STEM fields. Access to AP courses is one of the important elements of the curriculum, especially because "one third of all AP courses are in STEM disciplines" (Hagedorn & Purnamasari, 2012, p. 151). The development of science-related skills like scientific literacy and lab-based skills, and the ability to communicate ideas and work collaboratively are aspects of a strong school culture that promotes occupational development.

"Lack of access to the rigor of AP courses has serious implications for creating a college-going STEM community for minorities within low income areas" (Hagedorn & Purnamasari, 2012, p. 151). Minority schools have been found to lack AP courses, and research suggests that minority students do not take advantage of them when they are available (Hagedorn & Purnamasari, 2012; Solorzano & Ornelas, 2004). Contrary to the research, the magnet program in this study exceeded the average curriculum of most inner-city schools with its graduation requirements, number of AP offerings, types of classes offered, the number of minority students challenging themselves with these courses to prepare for successful postsecondary pursuits.

The curriculum accessed by students was reportedly rich in the development of communication and technical skills, fostered inquiry, and developed literacy especially within

the science field. Student responses indicated that they are learning to work collaboratively, to display information in nonverbal ways, and to make use of technology as a tool for communicating ideas. Students had access to various types of scientific tools and were being asked to write up their findings in ways that mimic the scientific community. The composite developed to measure the level of scientific literacy and inquiry within the school program supported these findings and indicated that students were exposed to a curriculum that frequently developed student literacy and inquiry in their science classes.

On the other hand, the integration of science literacy, science careers, and inquiry was not a frequent occurrence in classes other than science. Data on teacher participation in voluntary school-wide themes support this finding; this finding is specifically based on student perceptions that nonscience teacher participation in the yearly school theme had decreased since its implementation four years previously. Lack of participation from nonscience teachers can impact the reach of the school theme and decrease integration across various disciplines.

Research Question 3

This question was designed to determine the levels of occupational identity and career maturity of students who had participated in the experiential Hospital Careers Program. A majority of the students within the experiential program demonstrate high levels of occupational identity development. The survey composite and the coded interviews support that most students had a strong identity that revolved around their career goals and actions. Students have increased access to professionals within the field who have served as mentors, advisors, and role models. Participants also demonstrated high levels of career maturity when measured using the Crites's Career Inventory. This reality counters the literature, which has stated, "Poor adolescents will

have had less opportunity to develop or utilize an informational style of self-theorizing" (Phillips & Pittman, 2003, p.123); or, "Many poor adolescents . . . settle quickly and prematurely into roles that fail to take advantage of all of the adolescents' potential" (Phillips & Pittman, 2003, p. 123).

Occupational identity. From the survey data, occupational identity was measured as foreclosure and consideration. Foreclosure occurs when adolescents commit to an aspect of their identity without any exploration (Marcia, 2002). Consideration includes a process for determining which career is right for them rather than a whimsical or dream-like career choice. The literature has stated, "foreclosure should be more common amongst poor adolescents…" (Phillips & Pittman, 2003p.123). However, the majority of students within the study was not in a state of foreclosure and had determined their occupational goal based on experience and not on what someone told them would be best. The findings suggest that students had taken time to consider their career choices. From the interviews, occupational identity was measured via occupational goals, interests, and desires related to those goals, and actions that support goal attainment. Malanchuk et al. (2010) observed that middle class students may have considerably more support, access, and exposure to possible career options than low SES students; along those lines, only 22% of students enrolled in their junior year demonstrated the advanced levels of integrated identity development, and 47% of them demonstrated a supported identity development. Nonetheless, the anticipation was that low SES students would produce percentages that were far lower. Survey and interview responses displayed students at varied levels of occupational identity, but overall illustrated that participants had achieved high levels of occupational identity in fields outside of those common in the literature for minority students

(Constantine et al., 1998; Fouad & Byars-Winston, 2005; Grimmett, 2006; Hagedorn & Purnamasari, 2012). The findings of this study was such that low SES students who were enrolled in the experiential curriculum demonstrated higher levels of integrated occupational identity than the middle class students noted in previous studies.

The occupational identity of students was found to be influenced by many factors, which at times overlapped in relevance and influence. For example, student curiosity, which determines student career maturity, is closely related to student interest, which determines occupational identity. Likewise, student confidence about their career choice, which is used to measure maturity, is connected to their certainty, interest, and consideration of viable career options, which are all used to measure occupational identity. The consultation subscale of career maturity, which measures the extent to which students consult family, friends, and others, is connected to the access subscale that was used to measure student access through self-advocacy. Lastly, the concern subscale, used to measure career maturity, which addresses an individual's concern for the future and his or her ability to self-envision in future careers, is connected to his or her goal setting to successfully obtain future career plans and results in expressed occupational identity (goals, interest, and actions).

Access. The experiential program provided access to researchers and professionals in the medical field for minority students within the study. According to Epstein and Voorhis (2010), low-income students would normally not have this access. In this study, access to STEM-related fields was measured in terms of people students could speak to about their future career aspirations. There was some variation in the findings: the survey composite responses indicated that students spoke to their parents and friends frequently about their future education and career

goals. Coded survey responses indicated that students spoke to their family members (e.g., relatives other than parents and parents) far more than any other group. This pattern can be a problem for low socioeconomic students, as consulting parents and family members who may be within their same socioeconomic sphere and may not have the resources or knowledge to guide them into careers that exist outside of their socioeconomic sphere can be an impediment. Coded interview responses, however, did not suggest that peers or friends were individuals to whom participants turned to for advice. Interview data showed students seeking advice from family members and professionals in the field. For 3 out of 4 students interviewed, those professionals were from their site. Four out of 5 mentioned speaking to their parents about their future career, but only 2 students felt that the conversations were critical in helping them establishing their career choices. As such, access appears to range from parents and family members to professionals in the field, and the quality of access also varies.

Furthermore, career choices mentioned by students did not lean heavily toward those noted in the literature as being commonplace for minorities in low socioeconomic communities (Constantine et al., 1998), such as the fields of athletics, entertainment, or law enforcement (Grimmett, 2006). The majority of the students surveyed indicated strong interest in medicine- and science-related careers. Of those interviewed, only 1 student mentioned an interest in pursuing a career in entertainment. The access provided to medical professionals within the field gave students access to the work place and allowed students to interact with professionals, patients, and patient family members in ways that helped to shape their occupational identity and career maturity.

Career maturity. Maturity was measured using Crites's Career Maturity Inventory, in particular, the subscales of curiosity and confidence were used due to their measured reliability and consistency within this study. From the data, students appeared to demonstrate high levels of curiosity—an aspect that precedes career choice. In this case, the students had been exposed to many options, which allowed semistructured exploration. Confidence levels in their career choices were not as high as their curiosity levels in the Crites's subscales. The literature noted implied societal expectations of what minorities are able to do (Fouad & Byars-Winston, 2005), and perhaps this perceived notion was felt by students at their sites and impacted their confidence levels. Yet, interviews showed 4 out of 5 students certain of their career goals and choices. Students were asked to rate on a 10-point scale how sure they were that their current career goal was the one they wished to pursue; only 1student gave a score that was below an 8. This finding points to high levels of confidence, but could also be chance based on the 5 students selected for interviews. Overall, career maturity of the students in the study was higher than would be expected for minority students.

Limitations

The small sample and focus on minority students limits the generalizability of the findings. Additionally, confounding variables are a limitation common to experiential studies that can impact the generalizability of findings. Researchers Ewart and Sibthorp (2009) identified three categories of confounding variables that can potentially impact experiential studies: precursor, concomitant, and post experience variables. Within this study, precursor and concomitant variables were evident.

Precursor variables, such as a student's prior knowledge, experiences, and the

developmental stage of their occupational identity, can impact the data and findings. The quantitative data indicated that a large number of students (76%) were already interested in medicine and science when they enrolled in Archard Medical Magnet High School in the 9th grade. This notion was supported by student interviews, in which 4 out of 5 students indicated that they had already decided on the career path they wanted to pursue before entering the Hospital Careers Program. When asked about how they had become interested in their career choice, 4 out of 5 narrated experiences they had had prior to attending Archard. As such, no conclusions can be drawn about the specific influence of the experiential program on students' interest in a STEM career. However, this study sought to explore beyond interest to see whether students obtained greater access and exposure to STEM careers and developed their occupational identities.

Career identities during adolescence move through phases from exploration to commitment (Malanchuk et al., 2010; Phillips & Pittman, 2003). The Hospital Careers Program and its experiential curriculum is a tool of exploration for the students enrolled in the program. Experiential learning theory has been widely used by many sectors and aligns well with the process of identity development (Grotevant, 1987; Phillips & Pittman, 2003). This learning theory is based on metacognitive reflection and concrete experiences, which shape the understanding of students about themselves and possible career pathways. This process is very similar to the exploration and evaluation process of identity development. As such, when used correctly, it can work to provide rich learning experiences and identity development at the same time.

Additionally, concomitant variables, which arise during the experience itself, can impact the outcomes and student responses immediately after the experience. For example, student responses to whether this experiential model was successful in providing them with concrete experiences they could use to determine whether a career in STEM was a realistic option were varied. Now in their junior year, 73% of students reported still being interested in a career in medicine or science. Initially, 16% of the students indicated being undecided in the 9th grade, but those numbers decreased slightly to 12% of students by their junior year. These changes indicate that the students were thinking critically about their future careers and show occupational identity development based on concrete experiences rather than idealistic or whimsical desires.

The concrete experiences that students have under the experiential model can vary greatly by site and departments in a particular site. These concrete experiences create "situational impacts" (Ewert & Sibthorp, 2009. p. 380), which fall into the category of concomitant variables. Other factors, such as student's perceived ability and student's self-advocacy, are outside factors that can influence student experiences at their sites. Negative experiences and interactions may deter student interest and push them away from STEM fields or careers. As such, these variables may have influenced the findings. Adapting the curriculum to include aspects of self-advocacy may help to counter these types of variables.

Significance of Findings

The experiential curriculum at Archard Medical Magnet High Schools addresses the social justice issue of access, which includes Rawl's theory of fairness. The individual's right to "self-respect, access to employment, educational and decision making opportunities, and the

freedom to pursue one's" own concept of the "social primary goods" (North, 2006, p. 512) is redressed by exposing minority students to STEM fields in which they are normally underrepresented. Exposure in an experiential manner also gives students a realistic view of the field and allows them to make decisions based on their experience and ability. An individual who has made a career choice based on interest and ability is more likely to stick to the field, resulting in an increase in the enrollment of minority STEM majors and countering the troubling issues of enrollment, retention, and attrition rates noted in the literature on minorities in college-level STEM fields and beyond (Chang et al., 2011; Hagedorn & Purnamasari, 2012; Reid, 2008; Whalen & Shelley, 2010).

The diminished social network experienced by low SES status students is also improved through the experiential Hospital Careers Program. The professionals at the Hospital Careers sites provide a plethora of occupational development for low SES minority students: they are role models who show students how to behave in a professional environment; they are mentors providing advice and leads; they are a resource that provides a wealth of knowledge; they provide diversity and expose students to working with people different from them in a professional environment. Many students shared that professionals often gave them tips on the various paths they could take within medicine- and science-related fields. Professionals shared their experiences and took time out of their days to share resources they thought might help students. Knowing that students have access to these professionals suggests that this type of curriculum has the potential to providing important access for minorities and underrepresented groups within all fields. Even students who discovered through this process that a career in

medicine and science was not for them could achieve skills in accessing other individuals related to their chosen career interest.

Recommendations

For the minority students who participated in this study, the experiential curriculum worked well in support of student identity development around their future career aspirations. Even the interviewed student who did not wish to pursue a career in a medicine-related field demonstrated occupational development in stating, “Now I know what I don’t want to do.” For students still grappling with their career choice in their junior year of high school, perhaps a required student aptitude or career inventory that matches their interest and ability with future career options should be a requirement. In addition, to counter the concomitant variable that involves negative experiences at their sites where student ability (self-perceived or perceived by their site supervisors) are an issue, the experiential curriculum at the school site should be sure to include modules on self-advocacy, communication, and the types of student-patient involvement that is reasonable and legal at their sites. These modules would help students gauge what roles they can realistically play at their site as well as ways to communicate their desire to learn from and support the staff at their sites.

Because occupational identity development begins in early adolescence, middle schools might want to consider adding experiential components to their curriculum, especially in STEM fields and other areas where minorities are underrepresented. Insight from both quantitative and qualitative data, which indicates that most students had an idea about what career path they wanted to pursue prior to entering high school, supports the need for access and exposure to underrepresented fields earlier than high school. Articulation between feeder middle schools and

their supporting high schools will be an important aspect of creating this type of support and culture. This commitment can be difficult for magnet schools because students are often bused in from all over the district. This plan would require support on a district level to provide, time, space, and support for such articulation between colleagues to occur.

The biggest weakness with the program as expressed by students was that they wanted to do more or see more at their placement sites. It was unclear whether this issue was connected to site limitations (patient privacy and rights), student self-advocacy (simply expressing their willingness to others), or perceived limitations set by the students themselves or a supervisor in charge. During interviews, though, it became apparent that the desire to do and see more was driven by student interest and not lack of engagement at their sites. Interviewed students had specific roles that they played at their site, which ranged from scheduling appointments, doing routine indicator tests, and observing various procedures. These students longed for specific experiences that were outside the scope of what they could realistically do at their sites given their current levels of skill and education. However, their expressed interest in doing more indicates a genuine curiosity, which may contribute to their occupational development.

Experiences at their sites provided additional insight to the fields of research, medicine, and science and initiated a network of knowledge, professionals, and mentors for students wishing to enter medicine- and science-related fields. For a nation seeking to increase or maintain its presence within the STEM arena, this curriculum presents a promising option for producing a focused and competent workforce.

To support the communication and technical skills developed at their sites, a good culminating activity for the school to consider would be implementing a “Careers Resume.” In

this resume, students would highlight their entry-level skills as well as medicine and science related skills they had acquired throughout the year at their site. This project would support the continued growth of the STEM pipeline at various levels:

- It would provide entry-level access for students who wish to go directly into the workforce, helping them to articulate their skills and abilities as well as secure references within the field
- It would enable entry-level access for those wishing to pursue a postsecondary education but who have to obtain work in order to make that dream a reality due to their low socioeconomic status and the increasing cost of obtaining a postsecondary degree.

A good STEM-based curriculum also involves rigor and access to AP courses; developing communication skills, technical skills, computer literacy skills as well as the ability to collaborate and cultivate habits of mind that mimic the scientific community. How important is it that teachers other than science teachers participate in the development of student scientific literacy and technical skills like report writing for example? This level of interdisciplinary instruction could work to improve academic success and support for our minority students. A curriculum that is both rigorous (provides access to AP classes) and develops scientific literacy and skills provides the exposure that increases student success in STEM fields. This type of interdisciplinary holistic approach would allow additional exposure for students within the careers program but is also critical for students not in the experiential program. The voluntary state of school theme participation impacts the ability of these efforts to provide additional exposure especially for students not enrolled in the experiential program. Administrators of themed schools should be given leeway to include theme participation or support for the school's vision and mission in teacher evaluation to ensure that all teachers are supporting the vision and

mission of the site.

To see the occupational identity development of so many minority students toward careers that counter stereotypical fields suggests the validity of an experiential curriculum. Knowing that these students have been given the opportunity to transform their circumstances and contribute to greater society is a good that is nothing other than social justice. Support from district and school site leaders is important for the continued growth, success, and development of experiential programs, especially for low SES students and in fields where minorities are underrepresented.

Finally, if parents and family members are the most consulted individuals for students, as shown in the data, then the need for parent workshops in areas where an experiential curriculum is unavailable might be helpful. Equipping parents with information about internships and programs that provide enrichment along the lines of student interest would empower parents to coach their students toward their career goals, in addition to participating in the encouraging conversations reported in this study.

Future Research

To gain better insight to the effects of this curriculum on minority youth, several follow-up studies should be considered. First, researchers should measure the occupational identity, levels of access, and career maturity of students prior to the start of an experiential program, then again after a semester or year of the program to determine the direct impact of the curriculum on students. Such a study would measure change in students from before to after the experiential curriculum, allowing researchers and educators to have a sense of the overall value in participating in such a program.

Next, researchers should measure the occupational identity, levels of access, and career maturity of students who are in the experiential Hospital Careers Program versus students of the same age and grade who are not within the Hospital Careers Program to determine if differences exist that directly link any changes to the program itself. A comparison study would offer insight as to whether the experiential program is helpful in developing occupational identity over and above the typical participation in a rigorous general school curriculum.

Additionally, because the program is only offered during the junior year, a study that includes seniors who participated in the program during their previous year would give insight to the lasting effects of the experiential program. Students' occupational identity may peak during their participation in an experiential program because of the salience of working with professionals in the field and the prospect of medicine and science as a potential career. Knowing whether the program works to influence long-term commitment would be beneficial to educators, especially given the high attrition rates of STEM majors. Isolating the specific components of the program that assist high school students in their commitment to the field may help improve retention of college students in STEM-related fields and careers. Additionally, a correlation to determine the relationship between occupational identity and Career Maturity would aid in understanding the dynamics of this development and may give clues that would have instructional benefits to understanding how we may improve one or the other and the impact it would have on student development.

Finally, a longitudinal study, following low SES students as early as the middle school years when occupational identity first begins through high school and beyond, would measure

the growth in occupational identity and career interest of students over time. Such a study would allow researchers to identify when during an individual's development occupational identity is most influenced and may suggest that experiential programs are needed at an earlier age than high school. A study that follows students post–high school would allow researchers to quantify how many students successfully achieve their career goals and how many become established within the STEM field. Such evidence would further speak to the need of such an experiential program in areas where minorities are underrepresented.

Conclusion

In this study, the use of an experiential curriculum was effective in providing access and support to minority students toward the fields of medicine and science, in which Black and Latino students are underrepresented. Such a curriculum may be effective in supporting minorities toward other STEM fields, such as technology, mathematics, and engineering. As the curriculum of the magnet school demonstrates, an experiential curriculum alone is not enough to prepare minority students who face obstacles beyond access. A rigorous curriculum that includes access to Honors and AP courses would allow optimum preparation for collegiate postsecondary pursuits. Combined, access to professionals, experience in the field, and a rigorous curriculum give minorities tools that can be used to pursue their own ideas of "social primary goods," transforming their socioeconomic status and contributing to society in significant ways.

APPENDIX A

JUNIOR SURVEY INSTRUMENT

Occupational Identity Questionnaire (Junior)

Dear Students,

Read each item carefully. Be sure to respond to the total item and not just a certain part of it. Using the range of responses provided, indicate to what degree it fits your own impressions about yourself. You may begin by thinking about whether you agree or disagree with the given statement. Then you can decide how strongly you feel about it. Remember, we are interested in how these items either reflect or don't reflect how you perceive your own situations.

Thank you!

Ethnicity (check one or more. If you check other please fill in your identified ethnicity):	□ Black/African American □ Caucasian □ Hispanic/Latino □ American Indian □ Asian □ Pilipino □ Native American □Other_____
Grade Level	Junior Senior
What is your GPA?	< 2.0 2.0-2.5 2.6-2.9 3.0-3.4 3.5- 4.0 □ I don't know my GPA
What is your class rank?	_____ □ I don't know my class rank
Male or Female	MALE FEMALE

Identity	Strongly Disagree	Moderately Disagree	Disagree	Agree	Moderately Agree	Strongly Agree
1) I haven't chosen the occupation I really want to get into, and I will probably work at whatever is available until something better comes along:						
2) I am still trying to figure out my abilities (what I am good at) and what work would be right for me:						
3) I might have thought about a lot of different **jobs**, but						

there's never really been any question about what I will do since my parents told me what they want me to do:						
4) It took me a while to figure it out but now I really know what I want for a **career**:						
5) My parents decided a long time ago what I should go into for employment and I'm following through with their plans:						
Identity	**Strongly Disagree**	**Moderately Disagree**	**Disagree**	**Agree**	**Moderately Agree**	**Strongly Agree**
6) It took me a long time to decide but now I know for sure what direction to move in for a career:						
7) I just can't decide what to do for an occupation. There are so many possibilities:						

1) When I started attending King Drew in the 9th grade, I was interested in a career in:

□ Medicine □ Science □ I was undecided □ Other_____

2) As a junior I am currently interested in a career in:

□ Medicine □ Science □ I am undecided □ Other_____

3) This year I am participating in the school's medicine and science hospital careers program: □ Yes □ No

If NO *skip to question 4.*

IF YES *please answer the following:*

In the careers program, I currently work with researchers. □ Yes □ No

In the careers program I currently work directly with doctors and nurses. □ Yes □ No

In the careers program I currently work with other health personnel. □ Yes □ No

In the careers program I currently work with parents and children helping them interact in developmentally appropriate ways. □ Yes □ No

What are the pros (positive aspects) of your experience at your site so far?

_____
_____

_____

What are some things you'd like to see changed to improve your experience?

_____
_____

_____

At my site, I participate in the following activities that helped me develop the following skills **check all that apply**:

□ ***Communication:***

- □ I greet visitors and family members
- □ I arrange and scheduled appointments
- □ I assist with translation
- □ I work directly with patients helping them to feel comfortable
- □ I work directly with children helping them to interact in developmentally appropriate ways
- □ Other_____

□ ***Technical Skills:***

- □ I've learned CPR
- □ I've learned how to take vital signs
- □ I've learned how to operate various machines within the hospital setting
- □ Other

4) At school I've participated in the following activities that helped me develop the following skills check all that apply:

□ ***Communication:***

- □ I've made presentations to my teacher and class to communicate ideas
- □ I've participated in group or partnered activities that required me to collaborate and present ideas.
- □ I've created visual posters or displays to communicate ideas
- □ I've been required to use media and technology (computer programs, video, etc) to communicate ideas
- □ Other _____

□ ***Technical Skills:*** I've participated in labs and activities that required the use of scientific tools

- □ I've used pipettes
- □ I've used equipment associated with gel electrophoresis
- □ I've used microscopes
- □ I've used burettes
- □ I've used tools for dissection
- □ I've used probes and meters (pH, light, motion etc)
- □ I've written lab reports to communicate my understanding of concepts
- □ Other_____

5) I've participated in our school science fair (check all that applied to you):

□ 9th grade year □ 10th grade year

6) I was able to compete in the county or state science fair: □ Yes □ No

7) I am or have been involved in other science related clubs or competitions on campus: □ Yes □ No

If yes check all that apply:

- □ Robotics
- □ MESA
- □ Ocean Challenge Club
- □ Other_____

8) I am or have been involved in other science related programs, clubs or competitions off campus:

□ Yes □ No

If yes please name the program(s) you have been involved with:

1._____

2._____

3._____

4. _____

School Program/Demographics	**Never**	**Almost Never**	**Sometimes**	**Almost Always**	**Always**
9) In my 9th and 10th grade science classes' **labs were a regular** part of our science curriculum:					
10) . In my 9th and 10th grade science classes we were required to **write up lab reports** to demonstrate our understanding of the concepts and processes being covered in our labs:					
School Program/Demographics	**Never**	**Almost Never**	**Sometimes**	**Almost Always**	**Always**
11) In my 9th and 10th grade science classes we were required to **read scientific text including the text book**:					
12) In my 9th and 10th grade science classes we were required to read scientific text **other than the text book**:					

13) In the 9th and 10th grades the curriculum in **classes other than** my science class also touched on scientific inquiry, scientific concepts or science careers:					
14) In the 9th and 10th grade how often have you sought **out on campus** tutoring or support for your math or science classes?					
15) In the 9th and 10th grade how often have you sought out tutoring or support for your math or science classes **off campus?**					
16) In the 9th and 10th grades, I participated in **school sponsored** activities that enriched the local/Global community:					
***If so, check all that apply**:* □ Beach Clean Ups □ Creek Clean Ups □ Toy Drives □ Food Drives □ Book Drives □ Blood Drives □ Walks (AIDS/Cancer) □ Disaster Drives (Japan, Katrina, Haiti)					
17) Over the past three years I have challenged myself with Advanced Placement (AP) classes:					
I took AP classes in the following disciplines: □ English □ Mathematics □ Social Science (History) □ Science □ A World Language □ Computers □ Fine Art					

18. My freshman year my teachers participated in the Global Health theme ***(check the number of your teachers that participated in the theme in any way):***

□ 1 □ 2 □ 3 □ 4 □ 5 □ All of my teachers participate □ None of my teachers participated

19. My Sophomore year my teachers participated in the Holistic Health theme ***(check the number of your teachers that***

participated in the theme in any way):

□ 1 □ 2 □ 3 □ 4 □ 5 □ All of my teachers participate □ None of my teachers participated

20. So far this year my teachers are participating in the Building Bridges theme ***(check the number of your teachers that are participating in the theme in any way):***

□ 1 □ 2 □ 3 □ 4 □ 5 □ All of my teachers participate □ None of my teachers participated

Who do you go to for career advice?_____
_____

Access	**Almost Never**	**< once a month**	**1-3 times a month**	**Once a week**	**A few times a week**	**Almost every day**
1) How often do you talk with **your friends** about plans for **education after high school**?						
2) How often do you talk with **your teachers/counselors** about plans for **education after high school**?						
3) How often do you talk with your						

parents/guardians about plans for **education after high school**?						
4) How often do you talk with your **friends** about **future job/career plans**?						
5) How often do you talk with **your teachers/counselors** about future **job/career plans**?						
6) How often do you talk with **your parents/guardians** about your future **job or career plans**?						

Maturity	**Agree**	**Disagree**
There is no point in deciding on a job when the future is so uncertain.		
I know very little about the requirements of jobs		
I have so many interests that it is hard to choose just one occupation.		
Choosing a job is something that you do on your own		
I can't seem to become very concerned about my future occupation.		
I don't know how to go about getting into the kind of work I want to do.		
Everyone seems to tell me something different; as a result I don't know what kind of work to choose.		
If you have doubts about what you want to do, ask your parents or friends for advice.		
I seldom think about the job that I want to enter.		
I am having difficulty in preparing myself for the work that I want to do.		
I keep changing my occupational choice		
When it comes to choosing a career, I will ask other people to help me.		

I'm not going to worry about choosing an occupation until I am out of school.		
I don't know what courses I should take in school.		
I often daydream about what I want to be, but I really have not chosen an occupation yet.		
I will choose my career without paying attention to the feelings of other people.		
As far as choosing an occupation is concerned, something will come along sooner or later.		
I don't know whether my occupational plans are realistic		
There are so many things to consider in choosing an occupation; it is hard to make a decision.		
It is important to consult close friends and get their ideas before making an occupational choice.		
I really can't find any work that has much appeal to me		
I keep wondering how I can reconcile the kind of person I am with the kind of person I want to be in my occupation.		
I can't understand how some people can be so certain about what they want to do.		
In making career choices, one should pay attention to the thoughts and feelings of family members.		

APPENDIX B

INTERVIEW QUESTIONS

LMU Proposed Interview Questions

These are the leading questions proposed for student interviews:

Identity

1. Do you have a sense of the occupation you want to pursue?

2. What steps are you taking to make this a reality?

3. Did participation in the careers program influence your career decision? How?

Access

1. Have you talked to anyone about your future career plans? If yes who? (Counselor? Parent? Friends? Teachers? Professionals?)

2. How has the conversations helped you?

Maturity

1. How did you become interested in becoming a …… (addresses curiosity subscale - Crites)

2. How sure are you that this is the career you'd like to pursue? (addresses confidence subscale – Crites)

3. Have you ever met/ know/ talked to anyone in this field? (addresses consultation subscale – Crites)

4. What would a day as a …….look like? (addresses concern subscale – Crites which addresses an individual's ability to envision themselves in a line of work)

Demographics/ Program

1. Can you describe what you like best about the program?

2. Can you describe what you like least about the program?

APPENDIX C

DEFINITION OF TERMS

AC (Abstract Conceptualization) - an aspect of Kolb's experiential theory that describes an experience grounded in logic and rational evaluation (Kolb & Kolb, 2009).

AE (Active Experimentation) – an aspect of Kolb's experiential theory that follows abstract conceptualization and involves the testing of abstract concepts (Kolb & Kolb, 2009).

AP (Advanced Placement) – This prefix is used to describe college level classes offered in the high school setting for which students have the potential for earning college credit.

CE (Concrete Experiences) – an aspect of Kolb's experiential theory, which follows active experimentation and includes lived experiences (Kolb & Kolb, 2009).

CMI (Career Maturity Inventory) – An instrument designed by John O. Crites in 1978 to measure career choice attitudes and competencies of adolescents (Crites & Savickas, 1996).

CMI-R (Revised Career Maturity Inventory) – A revised version of Crites 1978 instrument. Revised in 1995 to include adolescents and adults as well as reduce administration time (Crites & Savickas, 1996).

EOME-2 Revised (Extended Measure of Ego Identity) – a field-tested instrument used to measure identity development

G.P.A. (Grade Point Average) – a score obtained by each student, based on his/her academic performance.

IMD (International Institute for Management Development) – One of the world's top ranked

business schools in executive education based out of Switzerland and publishers of the *World Competitiveness Yearbook.*

Kolb Experiential Learning Theory- A theory based on the work of John Dewey that focuses on learning as a cyclic process that lies on a continuum that includes concrete experiences metacognitive refection and specific learning modes

R&D – abbreviated way of referring to research and development

RO (Reflective Observation) – an aspect of Kolb's experiential theory which follows concrete experiences and includes unbiased reflection to shape the rationale of an individual and serve as the possible foundation for the next experimental cycle (Kolb & Kolb, 2009).

SES (Socio Economic Status) – refers to the economic class of a particular group.

Social Justice – In this study, the concept of social justice revolves around Rawl's theory of fairness which states that each individual has a right to "social primary goods," such as "self-respect, access to employment, educational and decision making opportunities, and the freedom to pursue one's own concept of the "social primary goods" (Brighouse, 2004; North, 2006; Rawls, 2001).

STEM (Science Technology Engineering and Math) - an acronym associated with these disciplines.

TAP Coalition (Tapping America's Potential Coalition) – An organization focused on increasing the number of individuals within STEM fields in the United States.

Themed Magnet – A magnet designed around a central career related theme i.e., communications, fine art, math science and technology, medical careers, law/government, business, and more (http://echoices.lausd.net/Mag/Default.aspx).

TIMS - (Trends in International Mathematics and Science Study)- A study conducted every 4 years that compares the performance of students from various nations in math and science.

REFERENCES

Abdulwahed, M., & Nagy, Z. K. (2009). Applying Kolb's experiential learning cycle for laboratory education. *Journal of Engineering Education*, *98*(3), 283–294.

Adragna, D. (2009). Influences on career choice during adolescence. *Psi Chi Journal of Undergraduate Research, 14*(1), 3–7.

Astramovich, R. L., & Harris, K. R. (2007). Promoting self-advocacy among minority students in school counseling. *Journal of Counseling & Development*, *85*(3), 269–276.

Atkinson, G., Jr., & Murrell, P. H. (1988). Kolb's experiential learning theory: a meta-model for career exploration. *Journal of Counseling & Development*, *66*(8), 374.

Bennion, L. D., & Adams, G. R. (1986). A revision of the extended version of the Objective Measure of Ego Identity Status: An identity instrument for use with late adolescents. *Journal of Adolescent Research, 1*,183–198.

Bevins, S. (2011). STEM: Moving the liberal arts education into the 21st century. *Technology & Engineering Teacher, 71*(4), 10–13.

Brighouse, H. (2004). *Justice.* Malden, MA: Polity.

Bureau of Labor Statistics (2010). Charting projections: 2008-2018. *Occupational Outlook Quartely, 53*(4).

Busacca, L. A., & Taber, B. J. (2002). The career maturity inventory-revised: A preliminary psychometric investigation. *Journal of Career Assessment, 10*(4), 441–455.

California Department of Education. (2011). School attendance review boards. Retrieved from http://www.cde.ca.gov/ls/ai/sb/

California Department of Education Publication. (n.d.). Recommended and required instructional minutes. Retrieved from http://pubs.cde.ca.gov/tcsii/ch3/rdmdrqirdinstmin.aspx

Chang, M. J., Eagan, M., Lin, M. H., & Hurtado, S. (2011). Considering the impact of racial stigmas and science identity: Persistence among biomedical and behavioral science aspirants. *Journal of Higher Education, 82*(5), 564–596.

Chisholm, C. U., Harris,, M. G., Northwood, D. O., & Johrendt, J. L. (2009). The characterisation of work-based learning by consideration of the theories of experiential learning. *European Journal of Education*, *44*(3), 319–337.

Constantine, M. G., Erickson, C. D., Banks, R. W., & Timberlake, T. L. (1998). challenges to the career development of urban racial and ethnic minority youth: Implications for vocational intervention. *Journal of Multicultural Counseling & Development*, *26*(2), 82–94.

Crites, J. O., & Savickas, M. L. (1996). Revision of the career maturity inventory. *Journal of Career Assessment March, 4,* 131-138.

Dewey, J. (n.d.) The collected works of John Dewey, 1882-1953. Electronic edition. Retrieved from www.pragmatism.org

Dewey, J. (1988). *The later works of John Dewey, 1925-1953. Volume 13: 1938-1939, Essays, Experience and Education, Freedom and Culture, and Theory of Valuation.* Carbondale, IL: University of Illinois Press.

Epstein, J., & Voorhis, F. (2010). School counselors' roles in developing partnerships with families and communities for student success. *Professional School Counseling*, *14*(1), 1–14.

Erikson, H. E. (1968). *Identity youth and crisis*. New York, NY: W.W. Norton.

Erikson, H. E. (1985). *Childhood and society.* New York, NY: W.W. Norton

Ewert, A., & Sibthorp, J. (2009). Creating outcomes through experiential education: the challenge of confounding variables. *Journal of Experiential Education*, *31*(3), 376–389.

Freeman, L. C. (2008). Establishing Effective Advising Practices to Influence Student Learning and Success. *Peer Review*, *10*(1), 12–14.

Foreman Jr. J. (2011). The Black poor, Black elites and America's prisons. *Cardozo Law Review*, *32*(3), 791–806.

Fouad, N. A., & Byars-Winston, A. M. (2005). Cultural context of career choice: meta-analysis of race/ethnicity differences. *Career Development Quarterly*, *53*(3), 223–233.

Gay, L. R., Mills, G., & Airasian, P. (2009). *Educational research competencies for analysis and applications.* Upper Saddle River, NJ: Pearson Education.

Grimmett, M. A. (2006). *Early career development of African American boys.* National Career Development Association. Retrieved from http://associationdatabase.com

Grotevant, H. D. (1987). Toward a process model of identity formation. *Journal of Adolescent Research, 2,* 203–222.

Guzdial, M. (2011). From science to engineering. *Communications of the ACM*, *54*(2), 37–39.

Hagedorn, L., & Purnamasari, A. (2012). A realistic look at STEM and the role of community colleges. *Community College Review*, *40*(2), 145–164.

Hamachek, D. E. (1988). Evaluating self-concept and ego development within Erikson's psychosocial framework: A Formulation. *Journal of Counseling & Development*, *66*(8), 354.

IMD International. (2012). *World competitiveness yearbook*. Lausanne, Switzerland: IMD International. Retrieved from http://www.imd.org/research/publications /wcy/upload/scoreboard.pdf

Kenny, M. E., Blustein, D. L., Chaves, A., Grossman, J. M., & Gallagher, L. A. (2003). The role of perceived barriers and relational support in the educational and vocational lives of urban high school students. *Journal of Counseling Psychology*, *50*(2), 142.

Kolb, A. Y., & Kolb, D. A. (2009). The learning way: Meta-cognitive aspects of experiential learning. *Simulation & Gaming*, *40*(3), 297–327.

Los Angeles Unified School District. (2012a). Program description page. Retrieved from (http://kingdrew-lausd-ca.schoolloop.com/cms/page_view?d=x&piid=&vpid =1349004807075).

Los Angeles Unified School District. (2012b). School Profile. Retrieved from http://search.lausd .k12.ca.us/cgibin/fccgi.exe?w3exec=school.profile.content&which=8727

Macovei, C. (2009). The forming of the vocational identity. *Bulletin Scientific*, *14*(2), 74–79.

Malanchuk, O., Messersmith, E. E., & Eccles, J. S. (2010). The ontogeny of career identities in adolescence. In S. Shulman & J.-E. Nurmi (Eds.), *The role of goals in navigating individual lives during emerging adulthood. New Directions for Child and Adolescent Development*, *130*, 97–110.

Marcia, J. E. (1993). The ego identity status approach to ego identity. In J. E. Marcia, A. S. Waterman, D. R. Matteson, S. L. Archer, & J. L. Orlofsky (Eds.), *Ego identity: A handbook for psychosocial research* (pp. 3–21). New York, NY: Springer-Verlag.

Marcia, J. E. (2002). Adolescence, identity, and the Bernardone family. *Identity*, *2*(3), 199–209.

Meeus, W. (1993). Occupational identity development, school performance, and social support in adolescence. *Adolescence*, *28*(112), 809.

Messersmith, E. E., Garrett, J. L., Davis-Kean, P. E., Malanchuk, O., & Eccles, J. S. (2008). Career development from adolescence through emerging adulthood: Insights from information technology occupations. *Journal of Adolescent Research*, *23*(2), 206–227.

National Center for Education Statistics (2008) *Trends in International Math and Science Study*

National Research Council. (2007). *Rising above the gathering storm: Energizing and employing America for a brighter economic future*. Washington, DC: The National Academies Press, 2007.

Ndura, E., Robinson, M., & Ochs, G. (2003). Minority students in high school advanced placement courses: Opportunity and equity denied. *American Secondary Education*, *32*(1), 21–38.

Noguera, P. (2008). *The trouble with Black boys*. San Francisco, CA: Jossey-Bass.

North, C. (2006). More than words? Delving into the substantive meaning(s) of "social justice" in education. *Review of Educational Research, 76,* 507.

Phillips, T. M., & Pittman, J. F. (2003). Identity processes in poor adolescents: Exploring the linkages between economic disadvantage and the primary task of adolescence. *Identity*, *3*(2), 115–129.

Rawls, J. (2001). *Justice as fairness: A restatement.* Cambridge, MA: Belknap Pressof Harvard University Press.

Reid, R. (2008). US not meeting “ambitious” goals for engineering graduates. *Civil Engineering*, *78*(9), 25–26.

Rossell, C. H. (2005). Magnet schools: No longer famous, but still intact. *Education Next, 5*(2), 44–49.

Rosser, S. V., & Taylor, M. (2008). Economic security. *Harvard International Review*, *30*(3), 20–24.

Savickas, M. L., & Porfeli, E. J. (2011). Revision of the career maturity inventory: The adaptability form. *Journal of Career Assessment*, *19*(4), 355–374.

Schwarz, N. (2007). Cognitive aspects of survey methodology. *Applied Cognitive Psychology, 21*, 277–287.

Solorzano, D. G., & Ornelas, A. (2004). A critical race analysis of Latina/o and African American advanced placement enrollment in public high schools. *High School Journal*, *87*(3), 15–26.

Tan, S. (2009). Misuses of KR20 and Cronbach's Alpha Reliability Coefficients. *Education & Science,* 34 (152), 101-112. Retrieved from http://egitimvebilim.ted.org.tr/index.php /EB/article/viewFile/595/75

Terrell, N. (2007). STEM occupations. *Occupational Outlook Quarterly*, 26–33. Retrieved from http://www.bls.gov/opub/ooq/2007/spring/art04.pdf

Thomas, E., & Wingert, P. (2010). American Universities are accepting more minorities than ever. Graduating them is another matter. *Newsweek Magazine.* Retrieved from http://www.thedailybeast.com/newsweek/2010/02/18/minority-report.html

US Bureau of Labor Statistics, (2012). Occupational Outlook Handbook. Retrieved from http://www.bls.gov/ooh/occupationfinder.htm?pay=%2435%2C000+to+%2454%2C999&education=&training=&newjobs=&growth=&submit=GO

US Census Bureau. (2010). United States 2010 census data. Retrieved from http://2010.census.gov/2010census/data/

Van Reusen, A. K. (1996). The self-advocacy strategy for education and transition planning. *Intervention in School & Clinic*, *32*(1), 49.

Whalen, D. F., & Shelley II, M. C. (2010). Academic success for STEM and non-STEM majors. *Journal of STEM Education: Innovations & Research*, *11*(1), 45–60.