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The impact of achievement goals on the help-seeking attitudes, perceptions, and behaviors of middle-school science students participating in inquiry-based education

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THE IMPACT OF ACHIEVEMENT GOALS ON THE HELP-SEEKING ATTITUDES, PERCEPTIONS, AND BEHAVIORS OF MIDDLE-SCHOOL SCIENCE STUDENTS PARTICIPTING IN INQUIRY-BASED EDUCATION

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Dissertation Abstract

Achievement Goals and the Help-Seeking Attitudes, Perceptions, and Behaviors of Middle-School Science Students Participating in Inquiry-Based Education

The purpose of this study was to investigate how mastery-oriented inquiry-based education influences the help-seeking attitudes, perceptions, and behaviors of middle-school students after participating in a 5-week intervention program.

Four eighth-grade science classes consisting of 123 students in one middle-school in the San Francisco Bay area were selected as a convenience sample. The sample was culturally diverse with no students receiving special education services and seven English Language learners.

Help-seeking attitudes and perceptions were assessed using help-seeking scales (general, instrumental, expedient, threat, avoidance, formal, and informal) before and after students participated in an inquiry-based 5-week intervention unit. Help-seeking behaviors were assessed daily during using the homework- and classwork-checklist sheet. Eight students identified with high instrumental and high expedient help-seeking scores were used to form four groups (homogeneous instrumental, homogeneous expedient, and two heterogeneous). Help-seeking attitudes and perceptions (general, instrumental, expedient, formal, and informal) were assessed from pretest to posttest. Help-seeking behaviors were assessed daily during using the homework- and classwork-checklist sheet. Group-level observations were completed weekly.

Dependent-samples *t* tests were conducted to examine the mean differences in pretest and posttest scores on the seven help-seeking scales after the intervention was

administered. The *t*-test analyses revealed statistically significant decreases in scores on help-seeking threat, help-seeking avoidance, and expedient help seeking, whereas *t*-test analyses revealed a statistically significant increase in informal help seeking at posttest in comparison with pretest scores.

For homogeneous instrumental students, decreases occurred in general, instrumental, expedient, and informal help seeking; for homogeneous expedient students, decreases occurred in instrumental and expedient help seeking; and increases occurred in general, formal, and informal help seeking for homogeneous expedient students from pretest to posttest.

For heterogeneous-instrumental students, decreases occurred for general, expedient, formal, and informal help seeking, and an increase occurred in instrumental help seeking. For heterogeneous-expedient students, increases occurred in general, instrumental, formal, and informal help seeking, and a decrease occurred for expedient help seeking.

Students made more help-seeking bids of peers than of any other source of help, especially in class. Instrumental students made more help-seeking bids than their expedient counterparts did.

This dissertation, written under the direction of the candidate's dissertation committee and approved by the members of the committee, has been presented to and accepted by the Faculty of the School of Education in partial fulfillment of the requirements for the degree of Doctor of Education. The content and research methodologies presented in this work represent the work the candidate alone.

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CHAPTER I

INTRODUCTION TO THE STUDY

Statement of the Problem

Effective educators regularly look for ways to improve educational programs, curriculum, and instruction to address middle-school student needs (National Research Council, 1996). As middle-school students enter into one of the most tumultuous periods of life experience, students often deal with overwhelming emotional and physical changes (Schools to Watch). Most middle-school students no longer spend large portions of the school day with a single teacher and one main group of peers that is typical of elementary school. Specifically, the middle-school environment becomes more competitive, impersonal, and formal (Taking Center Stage, TCS, 2001, p. 101). These developmental, physical, and environmental changes, typical of middle-school students, coincide with changes in student behavior. One very noticeable student change occurs in academic help-seeking behavior (Newman, 1990), and students who need help often fail to seek it (Newman). This help-seeking phenomenon occurs even in students who possess the cognitive awareness that assistance is needed and would be beneficial (Butler 1998; 2008; Nelson-LeGall, 1985; Nelson-LeGall & Resnick; 1998; Newman, 2008; Newman & Goldin, 1990, Taking Center Stage, 2001, p.110). Proactively seeking out ways to help students and educators understand more about their help-seeking tendencies using inquiry-based education as an instructional strategy is one way to combat this on-going middle-school phenomenon that occurs in science classrooms.

Collaboration among students occurs in several forms, and one very specific form of collaboration is academic help seeking (Newman, 1990). Academic help seeking

serves several purposes; some are negative, whereas some are highly adaptive and constructive (Newman). Academic help seeking includes working equally with other peers to find solutions to inquiry problems or asking a teacher for guidance to help solve an inquiry-based problem (Karabenick, 2003). Adaptive help seeking includes recognizing the need for help, enhancing competence, mastery of subject material, or merely seeking a solution to a problem (Nelson-LeGall, 1984; Nelson-LeGall & Resnick, 1998; Newman, 1990, 1998, 2006). When students are adaptive and strategic about the ways to seek help, they are labeled as instrumental help seekers. Unfortunately, help seeking can serve more negative, expedient functions as students copy answers from other students or ask the teacher for assistance before exhausting all resources whenever answers are unavailable. Some negative help-seeking purposes include expediently finishing a task without comprehension of the task, without increasing knowledge, or without mastering learning objectives (Nelson-LeGall). Expediently finishing a task serves to avoid criticism, avoid evaluation, or dodge task completion entirely (Nelson-LeGall). When students expediently seek help, students are identified as expedient help seekers.

Help seeking is a general problem-solving, learning, self-regulation strategy, and social-interactional process in which learners cope with academic challenges by gathering information from formal and informal sources to acquire knowledge and complete objectives (Grayson, Miller, & Clarke, 1998; Newman, 1990, 1998, 2006; Pape & Wang, 2003; Ryan, Gheen, & Midgley, 1998; Wolters, Pintrich, & Karabenick, 2003; Zimmerman, 2002). Learners seek help from formal sources, like teachers, and informal sources, like peers (Butler & Neuman, 1995; Karabenick, 1998, 2001, 2003; Pape &

Wang, 2003). Learners adopt differing attitudes toward help seeking considering previous experiences, self-esteem costs, and benefits associated with seeking help (Grayson et al.; Karabenick). Establishing how to create a more positive help-seeking experience for the middle-school science student is crucial to creating life-long science learners with instrumental help-seeking tendencies.

Middle-school students complete a broad education consisting of English, history, mathematics, and science. Mathematics and science education in the United States of America are scrutinized regularly from both learning and teaching perspectives (Bransford, Brown, & Cocking, 2000, pp. 79, 190), usually occurring in the form of an all-encompassing, large, high-stakes assessment (cde.gov). The most recent report of the Trends in International Mathematics and Science Study (TIMSS, US Department of Education, 2007) contains information on fourth- and eighth-grade students from 48 countries. The TIMSS measures mathematics and science knowledge and skills. The TIMSS science topic domains include biology, chemistry, physics, and earth sciences, whereas the TIMSS cognitive domains include knowledge, application, and reasoning skills. American students are performing well when compared with the 48 other countries with an average score that places United States (US) students, on average, in the top 10 ranked countries in biology, chemistry, and earth sciences; however, the US students fall out of the top 10 ranked countries in the physics domain. Whereas properly addressing specific science educational pedagogy benefits students, supporting the cognitive and metacognitive domains, like academic help seeking (Newman, 1990), ensures that students receive the best possible long-term science education (Anderson, 2002).

Science instruction has marked differences from other subject domains. Science classes incorporating inquiry-based instruction implement a shift from teacher-directed instructional practices to student-centered activities (Hofstein & Lunetta, 2004). Classroom practices like inquiry-based education create and promote a unique social-cultural climate (Covington, 2000) and social-interactional process (Wolters et al., 2003). Science teachers must implement instructional strategies to modify or change incorrect preconceptions that students have observed and noted outside of the classroom. Because inquiry-based instruction is student centered, students participate in collaborative work groups solving academic problems.

Growing attention from assessments like the TIMMS report (US Department of Education, 2007) forces educators to examine both instructional practices and the impact that educational programs have on the skill and knowledge set of students as well as influencing the cognitive processes of students. Supporting students in productive ways as they transition into and through middle school is tantamount in helping students develop into successful life-long learning collaborative workers (schoolstowatch.org). One commonly used instructional intervention strategy in science classrooms is inquiry-based education. One strategy exercised by students during inquiry-based instruction is academic help seeking (Karabenick, 2003). Academic help seeking has been understudied in the domain of science (Karabenick). Because participating in an inquiry-based educational program leads students to adopt mastery- and task-oriented achievement goals (Pajares, Brinter, & Valiante, 2000) and because achievement goals drive academic help seeking (Nelson-LeGall, 1984, 1985, 1989, 1990), students who participate in a mastery-oriented inquiry-based educational program should exhibit

preference for instrumental help seeking and a lower preference for expedient help seeking.

Although previous research provides separate salient information regarding the instrumental and expedient help-seeking styles within different educational environments, these previous investigations do not provide a complete picture of the cognitive and help-seeking attitudes, perceptions, and behaviors that middle-school students use to cope with academic and strategic help-seeking issues they encounter in an inquiry-based science classroom setting. Thus an investigation involving the use of inquiry-based education combined with mastery-oriented directions and reflective questioning in a middle-school science classroom has a beneficial effect on the instrumental help seeking of middle-school science students' help-seeking attitudes and behavior. Providing middle-school students with a treatment consisting of mastery-oriented inquiry-based education combined with an academic help-seeking education program allows teachers to help students better address students' help-seeking needs.

Purpose of the Study

The purpose of this study was to investigate how mastery-oriented inquiry-based education influences the help-seeking attitudes, perceptions, and behaviors of middle-school students. Middle-school students completing mastery- and task-oriented inquiry-based activities fostered more instrumental help-seeking attitudes toward academic help seeking. The first research question was how does mastery-oriented inquiry-based learning influence the help-seeking attitudes, perceptions, and behaviors of middle-school science students. The second research question was what changes occur to the help-seeking attitudes, perceptions, and behaviors (general help seeking, instrumental help

seeking, expedient help seeking, and source of help) of four homogeneous randomly selected identified instrumental help seekers from the available pool together during a class period for a 5-week mastery-oriented inquiry-based instructional unit. The third research question was what changes occur to the help-seeking attitudes, perceptions, and behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) of four homogeneous randomly selected identified expedient help seekers from the available pool together during a class periods for a 5-week mastery-oriented inquiry-based instructional unit. The fourth research question was what changes occur to the help-seeking attitudes, perceptions, and behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) of four heterogeneous randomly selected identified instrumental and expedient help seekers after placing two identified instrumental help seekers with two identified expedient help seekers for a 5-week mastery-oriented inquiry-based instructional unit. The last research question was what differences in help-seeking attitudes, perceptions, and behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) arose when comparing across the homogeneous instrumental group, the heterogeneous expedient group, and the two heterogeneous groupings that contain two instrumental and two expedient help seekers.

Student help-seeking attitudes and perceptions of help seeking were assessed before and after middle-school students participated in an inquiry-based education program using physics activities with mastery-oriented directions and focus questions for the duration a 5-week unit. Students help-seeking attitudes and perceptions were assessed by the help-seeking scales developed by Karabenick (2003) and Wolters et al.

(2003). The help-seeking scales included general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help.

Students completed the 19-item help-seeking scales (general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help) before beginning the treatment. The treatment consisted of providing students with a mastery-oriented educational program and examples of appropriate and inappropriate help seeking practices. Students were given regular reminders about appropriate and inappropriate help-seeking practices and completed daily student classwork- and homework-checklist sheets. Students also received regular in-class and out-of-class assignments. After obtaining the initial help-seeking scores, student scores were used to place a total of 16 students into groups of four based on instrumental and expedient help-seeking tendencies.

In order to select the 16 students for the student groupings, students with scores greater than 14 on the pretest help-seeking instrumental and expedient scales were considered. The number of 14 was decided by the researcher. Students could not be high on both instrumental and expedient subscales to be considered for these groupings. If students were considered high on either the instrumental scale or the expedient scale, but not on both scales, they were placed into the available pool from which students groupings would be created. From this available pool of students, students could be selected randomly and anonymously placed into a group of either homogeneous instrumental help seekers, homogeneous expedient help seekers, or a heterogeneous group consisting of two instrumental and expedient help seekers. Four students were

selected from the available pool for both the homogeneous instrumental help-seeking group from the first-class period. Two instrumental and two expedient students were selected from the available pool for the second-class period. Additionally, two instrumental and two expedient students were selected from the available pool for the third-class period. Four expedient student were selected from the available pool for the fourth class period. Weekly group-level observations were made on the student groupings by the student teacher in the room to assess the help-seeking behaviors of the students. The remaining students enrolled in the class were placed into groupings not based on help-seeking style.

All students completed the daily student classwork-checklist sheets and homework-checklist sheets in addition to completing regular in-class and out-of-class assignments while they were in class to assess help-seeking behavior tendencies. All students completed the 19-item help-seeking scales (general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help) at the conclusion of the treatment.

Achievement data, assessing the effectiveness of the inquiry-based educational program, included science grade and unit test score. Demographic data were collected to conduct additional analyses.

Background and Need

When students enter middle school, one noticeable change in student behavior is academic help seeking. When students are aware that they are in need of help, they do not actively seek help (Newman, 2006). Lack of help seeking makes it difficult for a teacher to assess student understanding to identify learning gaps. When instructors

incorporate intervention techniques such as inquiry-based education and provide help-seeking strategies to students, teachers help alleviate this on-going problem found in middle-school science classrooms.

The Trends in International Mathematics and Science Study (TIMSS, US Department of Education, 2007) compared information obtained from fourth- and eighth-grade students in 48 different countries. The TIMSS measures mathematics and science knowledge and skills. The adopted eighth-grade California Content Standards published by the California Department of Education (1998) for science are aligned with the TIMSS assessment. The TIMSS science topic domains include biology, chemistry, physics, and earth sciences, whereas the cognitive domains assess knowing, applying, and reasoning.

The average eighth-grade United States science scale score of 520 was ranked eighth out of 47 countries. On the surface, it appears that the teachers in the United States (US) are doing an acceptable job of teaching students science; however, US test scores have not risen since 1995. Furthermore, only 10% of US eighth graders have scores at or above the international unit level. Although they are scoring higher than the TIMMS scale average on the biology, chemistry, and earth sciences tests, the US eighth-grade students are falling short of the average scale score in the domain of physics.

TIMSS results are even more alarming when the relationships between fourth and eighth grade are examined. A dramatic decline occurs from overall fourth-grade score performance to eighth-grade overall score performance. Fourth graders are out-performing, on average, their eighth-grade counterparts. Although no measurable gender differences exist when examining the total science scores between fourth and eighth

grades, eighth-grade boys tend to outperform, on average, the eighth-grade girls in biology, physics, and earth sciences.

Poor test scores on the physics portion of the TIMSS report suggest that there are weaknesses occurring in both science classroom instruction and student preparation. Therefore, science education in the US has been examined from both the student's learning and teacher's teaching perspectives (Bransford, Brown, & Cocking, 2000, pp. 79, 190). Science classroom constraints include limited funding, access to materials and consumables, teacher training and professional development, and instructional time (Taking Center Stage, 2001, p. 11). Problems in science classrooms are compounded by a growing emphasis on excelling at standardized science tests, persuasive influence textbook publishers exert over educators, and teacher reports of frustration (Anderson, 2002).

Science classrooms incorporate a social-interactional component as students work with each other to solve authentic problems, generate queries, and complete tasks. This social-interaction consists of students collaborating with other students and peers. When students encounter difficulties, one option readily available is collaboration. One form of collaboration that students choose to participate in is academic help seeking (Newman, 1990). Students may seek help from either informal or formal sources (Karabenick, 2001, 2003).

Academic help-seeking intentions rest on mastery- and performance-oriented achievement goals (Ryan, Patrick & Shim, 2005; Wolters, Pintrich, & Karabenick, 2003). Classroom practices guide and establish achievement goal structures (Turner et al., 2002). These individual achievement goals influence student attitudes and drive academic help

seeking. There is much support indicating that students participating in mastery- and task-achievement goals seek out more instrumental help seeking (Arbreton, 1998; Butler, 1998, 2008; Karabenick, 2001, 2003; Newman, 1990, 2002; Ryan & Pintrich, 1997). The opposite holds true for the contrasting relative-ability, performance, and ego goals (Arbreton; Butler, 1998; Karabenick, 2003; Newman 1998; Ryan & Pintrich). Students operating under performance-goal conditions seek out more expedient ways to find the help they need (Bong, 2008; Karabenick, 2001, 2003; Kennedy, 1997; Stavrianopulos, 2007; Tanaka, Murakami, Okuno, & Yamauchi, 2002). Academic help-seeking intentions are stifled when students operate under relative-ability goals.

Achievement-goal perspective influences help-seeking style (Tanaka et al., 2002; Turner et al., 2002; Wolters et al., 2003). There are two types of academic-help seeking-styles: instrumental and expedient help seeking. Researchers have investigated the differences between instrumental and expedient help seeking (Bembenutty, 2006; Butler, 1998; Butler & Neuman, 1995; Karabenick, 1998, 2001, 2003; Karabenick & Knapp, 1991; Tanaka et al. 2002; Taplin, Yum, Jegede, Fan, & Chan, 2001). Whereas instrumental help seeking exists when students use independent- and mastery-oriented efforts to find a solution limiting the amount and type of help to be able to solve the problem independently (Nelson-LeGall & Glor-Scheib, 1986; Nelson-LeGall & Resnick, 1998), excessive and expedient help seeking occurs when help is sought excessively or at inappropriate times, usually before exhausting all individual efforts. Expedient help seeking occurs when help seekers obtain assistance with the intention of having someone else solve the problem or reducing the time and effort required to complete the task (Butler, 1998, 2008; Karabenick, 1998, 2003). Instrumental help is designed to acquire

information or skills necessary to learn independently and improve the quality of performance (Karabenick). Indirect help, clues, and hints are useful for students seeking instrumental help (Karabenick).

A summary of help-seeking styles is listed in Table 1.

Table 1
Types and Definitions of Help-Seeking Styles

Type of Help-Seeking Style	Achievement Goal Preference	Definition of Help-Seeking Style
Instrumental	Mastery or task	Student generated help seeking after repeated attempts to address the problem have failed. Characterized by requests for hints rather than expedient answers or solutions. Allows help seeker to maintain independence and autonomy (Butler, 1998).
Excessive or Expedient	Performance or ego	Student learning centered around a particular outcome such as a grade or comparison with other students. Focused on a particular outcome, grade, or performance level. Usually not interested in learning for the sake of learning (Karabenick, 2003).

Nelson-LeGall (1984) and Nelson-LeGall and Glor-Scheib (1985) examined elementary-school students' instrumental and expedient help solicitations, bids, and requests in reading and mathematics. Nelson-LeGall learned that, as age increases, the amount of necessary help seeking also increases. Additionally, low-ability students made more mastery and instrumental help-seeking requests. Nelson-LeGall observed that fifth graders made more expedient help requests than third graders and that cheating decreased by both age and ability (Nelson-LeGall & Glor-Scheib). Butler (1998) measured the degree to which students aged 10 to 12 would try to solve mathematics problems alone while using instrumental requests for hints and directions and while using executive and expedient requests. Because Nelson-LeGall observed differences in help-seeking style in

reading and mathematics in elementary students in third and fifth grade, investigating which help-seeking styles that middle-school students gravitate toward before and after an intervention of help-seeking strategies and inquiry-based education may be similar to the older students in Nelson-LeGall's, Nelson-LeGall and Glor-Scheib's, and Butler's studies.

Measuring attitudes and perceptions of help seeking was first investigated by Karabenick (1988, 2001, 2003). In separate studies of college students, Karabenick's results suggest that expedient help seekers experienced high levels of threat and avoidance. Karabenick used the adapted form of the Motivated Styles Learning Questionnaire (MSLQ) and five help-seeking scales with college students enrolled in chemistry and organic chemistry classes. Karabenick and Knapp's (1991) data imply that instrumental help seeking is associated closely with formal sources of help. Even though help seeking has been examined in several different samples, these studies did not investigate the classroom specific contexts that rest on the foundation of achievement goals.

Although the studies performed by Butler (1998), Karabenick (2003), Karabenick and Knapp (1991), Nelson-LeGall (1984), and Nelson-LeGall and Glor-Scheib (1985) provide a wide age range involving instrumental and expedient help seeking, middle-school students are set apart from their elementary-school, high-school, and college-level peers for several reasons. Middle-school students are like their elementary-school counterparts because they are not yet tracked into achievement-level courses (schoolstowatch.org; Taking Center Stage, 2001), and middle-school students are similar to their high-school and college-level counterparts because they are enrolled in a

secondary-educational program in a domain specific class. Other marked differences exist between middle-school students and college students. College students have self-selected themselves into courses as well as into school. These reasons make the middle-school academic experience unique.

Results involving help-seeking studies of gender have produced mixed results. Some studies have found statistically significant gender differences in attitudes toward help seeking, perceptions of help seeking, and style of help seeking, whereas other studies did not identify gender differences. Nelson-LeGall's (1984) study suggested that gender differences existed in the help-seeking style. The girls in this study requested instrumental help more than boys did in mathematics. Nelson-LeGall and Glor-Scheib's (1986) results suggest that girls displayed higher levels of perceived academic competence than their male counterparts in both reading and mathematics. Butler (2008) identified girls who were more likely to seek help than boys when participating in ability grouped and tracked mathematics classes. Nelson-LeGall and Glor-Scheib found no differences in gender in terms of perceptions of help seeking. Further classroom specific contexts investigating gender are needed (Nelson-LeGall & Resnick, 1998) to better understand the nature of middle-school students and the impact that inquiry-based-science-education programs have on gender.

In addition to middle school providing a unique environmental setting, science courses in middle schools differ from those found in elementary-school, high-school, and college-level programs. Middle-school students participate in their first domain specific educational program in science. An investigation involving the unique nature of science education combined with the middle-school experience has yet to be completed. An

investigation that specifically examines the help-seeking attitudes and perceptions of middle-school science students who participate in an inquiry-based educational program that supports task- and mastery-oriented achievement goals is lacking. Science classrooms provide students with different learning experiences that allow students to create products while working closely with other students and teachers. Middle-school science classrooms offer a unique experience for students, and the relationship between inquiry activities and how these activities influence help seeking needs to be investigated. Specifically inquiry-based educational practices promote instrumental help-seeking practices allowing students to collaborate with peers and adults in order to solve problems and develop instrumental help-seeking attitudes, perceptions, and behaviors.

Demographic information, general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking anxiety, and source of help data were collected from 123 eighth-grade middle-school science students. Students completed the 19-item help-seeking measure assessing instrumental help seeking, expedient help seeking, help-seeking avoidance, help-seeking threat, and source of help developed by Karabenick (2003) and Wolters et al. (2003). Research provided by the help-seeking literature suggested that inquiry-based practices ought to empower students to participate actively and independently in their education (Anderson, 2002; Hofstein & Lunetta, 2004) positively impacting general and instrumental help-seeking attitudes, perceptions, and behaviors in a positive way by encouraging students to operate under mastery- and task-oriented goals.

Theoretical Rationale

This study examined how attitudes and perceptions of academic help seeking are influenced by participation in a long-term mastery-oriented inquiry-based educational program over a 5-week period.

Achievement goals influence the quality, timing, and appropriateness of cognitive (Covington, 2000). Achievement-goal theory is characterized by the purposes of completing tasks and achievement behavior (Tanaka et al., 2002), by examining patterns of beliefs and attributions that students act upon during academic tasks (Covington), and achievement-goal theory aims to explain how students approach, engage in, and respond to various achievement activities (Nelson-LeGall, 1984, 1985, 1989; Nelson-LeGall & Resnick, 1998). Either students are attentive to developing, mastering, and improving tasks and activities in order to improve ability, or students are concerned with finishing and completing tasks in order to prove ability. These two contrasting views are driven by mastery goals and relative-ability goals, respectively. When students value improving and learning in order to master and increase knowledge in a particular domain, they are referred to as mastery- or task-oriented students. When students prefer to prove ability or expediently finish tasks in a particular domain, they are referred to as relative-ability-, performance-, or ego-oriented (Skaalvik & Skaalvik, 2005) students.

Academic help seeking can be explained by achievement goal theory because achievement goals influence the cognition of students (Covington, 2000). When students seek help with aspirations to master, improve, or develop learning, they operate under mastery or task goals (Skaalvik & Skaalvik, 2005). The process of learning and developing understanding are ends in themselves. This proactive help-seeking

phenomenon is known as adaptive help seeking. Students desire help that may consist of hints, similar examples, or further clarification (Tanaka, Murakami, Okuno, & Yamauchi, 2002). Adaptive (Tanaka et al.), autonomous (Aberbach, Lynch, & Eccles, 1991), or executive (Aberbach et al.; Newman, 1990) help seekers strive to limit the amount of help that allows them to be able to solve problems on their own. Help seeking occurs at appropriate times. Adaptive help seekers who possess mastery goals also display lower levels of help-seeking threat or anxiousness (Turner et al., 2002) during the help-seeking process and will seek help from both formal and informal sources (Karabenick, 2003). Inquiry-based education that incorporates an active process of learning for students helps students focus less on acquiring answers and more focused on the process of learning itself. As students develop mastery-oriented achievement goals, a desire for instrumental help seeking should increase.

Not all students solicit adaptive, autonomous, and instrumental help. When students seek help with aspirations to perform or prove ability, they operate under relative-ability-, performance-, or ego-oriented goals (Skaalvik & Skaalvik, 2005). Ego-oriented students are preoccupied with social comparisons and being judged as able. Performance- or ego-oriented goals result in help seeking that is characterized by expedient and excessive (Aberbach et al., 1991) attempts. An expedient help-seeking student will solicit help before exhausting all individual effort or resources. Expedient and excessive help seeking is characterized by cheating. Expedient and excessive help seekers tend to show higher levels of help-seeking anxiety (Karabenick, 2003) and help-seeking threat (Tanaka et al., 2002). Expedient and excessive help seekers tend to choose informal sources of help rather than formal sources (Karabenick, 2003). Because

inquiry-based education allows learners to apply knowledge while collaborating in groups (Hofstein & Lunetta, 2004), inquiry-based learning allows learners to take command of their own learning removing the focus from grades or performance. When students take lead of their own learning, educators should find fewer examples of expedient and excessive help seeking (Karabenick, 2001, 2003; Newman, 1990; 2002) in the classroom.

Research provided by Turner et al. (2002) suggests that environment guides attitudes toward achievement-goal orientation. Specifically, mastery-oriented classrooms lead to lower levels of help avoidance and lower levels of threat. Therefore, inquiry-based education when used as an instructional, intervention strategy establishes a mastery-oriented classroom setting. Inquiry-based practices commonly used by science teachers allow students to guide themselves to operate under task goals (Anderson, 2002; Eylon & Linn, 1988). Inquiry-based educational assessments allow students to have classroom experiences that mimic real-world problems and incorporate real-world phenomenon. The inquiry-process perspective incorporates mastery-oriented tasks, engaging students by incorporating stages of oral and written discourse (Anderson). This classroom educational technique can aid in the progress of process skills, enhance academic performance, and develop ability (Mattheis & Nakayama, 1988). Teachers guide students to answers using authentic questions that are generated by student experiences (Anderson, 2002). Inquiry-based activities call for collaboration among students and community (Anderson). One of these collaboration techniques, whether sought from adults or peers, is academic help seeking. Once positive attitudes toward academic help seeking exist, cycles of learning and help seeking may occur.

If students participate in inquiry-based education with the added emphasis of mastery-oriented directions, student attitudes, perceptions, and behaviors of help seeking should change. Students should show higher levels of general help seeking and instrumental help seeking. Students should show lower levels of expedient help seeking, lower levels of help-seeking threat, lower levels of anxiety, and lower levels of help-seeking avoidance.

The breadth of the help-seeking literature led Karabenick (1998, 2001, 2003) to conceive a measurement tool assessing student help-seeking motivation and tendencies. Karabenick (2003) used this assessment with college students enrolled in both general and organic chemistry courses. Bembenutty (2006) performed additional assessments on teachers enrolled in a teacher-preparation program. The measure, used in the 2003 study, included 47-items from Karabenick's five help-seeking scales. The help-seeking scales, originally written for survey in several college classes, were written generically so that the questions are tailored to fit any subject domain and contain phrases like *in this class*. Only three studies were identified that sampled from students enrolled in a middle-school-mathematics classroom (Newman, 1990; Pape & Wang, 2003; Tanaka et al., 2002). An investigation of help seeking in a middle-school science classroom that incorporates inquiry-based education has yet to be completed. Furthermore help-seeking attitudes have not been explored in middle-school science students, only in older science students.

In summary, middle-school science-classroom environments take on very different appearances. One instructional strategy implemented by middle-school science teachers is inquiry-based education. Achievement goals influence the help-seeking

attitudes, perceptions, and behaviors of middle-school students. Cognitive processes are measured using achievement measures like science course grade and science unit exam score. Help seeking is measured by six help-seeking scales (general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help).

Research Questions

This study addressed the following five research questions. The research question used mastery-oriented inquiry-based education and a treatment of helping students develop appropriate help-seeking practices as independent variables. The research questions used general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, avoidance, and help-seeking avoidance, source of help scales (Karabenick, 2003; Wolters et al., 2003), self-reported homework help seeking, and self-reported classwork help seeking as dependent variables. Additionally, homework study time, final grade, unit test score, gender, free or reduced lunch, English Language Learner (ELL), and class period were additional variables used in this study.

1. What is the extent of the difference in the change in help-seeking attitudes, perceptions, and behaviors as measured by the help-seeking scales (general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help) from pretest to posttest after students receive a treatment designed to help students develop appropriate help-seeking practices?
2. What changes occur to the help-seeking attitudes, perceptions, and behaviors (general help seeking, instrumental help seeking, expedient help seeking, and

source of help) of four homogeneous randomly selected identified instrumental help seekers from the available pool together during a class period for a 5-week mastery-oriented inquiry-based instructional unit?

3. What changes occur to the help-seeking attitudes, perceptions, and behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) of four homogeneous randomly selected identified expedient help seekers from the available pool together during a class periods for a 5-week mastery-oriented inquiry-based instructional unit?
4. What changes occur to the help-seeking attitudes, perceptions, and behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) of four heterogeneous randomly selected identified instrumental and expedient help seekers after placing two identified instrumental help seekers with two identified expedient help seekers for a 5-week mastery-oriented inquiry-based instructional unit?
5. What differences in help-seeking attitudes, perceptions, and behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) arose when comparing across the homogeneous instrumental group, the heterogeneous expedient group, and the two heterogeneous groupings that contain two instrumental and two expedient help seekers?

Significance of the Study

Teachers are under tremendous pressure to raise standardized test scores for all students. In California, eighth-grade students are tested in English, history, mathematics, and science. Students are struggling on the Physics subject domain in science tests.

Science teachers must find ways to increase student knowledge and comprehension of science material, specifically in the area of Physics.

Encouraging students to operate under mastery and task goals (Kolodner, 2003) increases the value of science knowledge among middle-school students, helping students achieve at higher levels and decreasing course anxiety.

When mastery-oriented tasks are combined with inquiry-based instruction, students identify and work with problems embedded within real-world content to create artifacts while constructing new knowledge. Students are able to maintain autonomy over their learning. Therefore, students learn to regulate their own academic cognition and academic behavior identifying when appropriate help is needed. Maintaining autonomy over academic cognition and behavior may create environments in which students become life-long learners with well-developed help-seeking and study skills. Allowing students to navigate their own learning experiences not only may help student achievement but also increase student motivation.

When mastery-oriented tasks are paired with inquiry-based education, collaboration with peers, teachers, and community members is fostered. Therefore, students exhibit higher levels of instrumental help seeking, lower levels of expedient help seeking, lower levels of help-seeking threat, and lower levels of help-seeking avoidance from both formal and informal sources. Mastery-oriented goals help students develop the communication skill set to be able to reach out for help when help is needed. If students experience lower levels of help-seeking threat and anxiety, then the students are better equipped to seek out help allowing teachers to better support them.

When students operate under mastery-oriented goals, gains in student achievement occur. This study adds to the effectiveness of inquiry as an instructional strategy, extending beyond the cognitive benefits, and focusing on the metacognitive benefits of inquiry-based education, and especially benefiting the metacognitive benefits associated with academic help seeking.

These reasons are important to middle-school teachers because middle-school teachers need to know, understand, and be reminded how important the learning environment is for students. Teachers can incorporate these strategies into classroom practices to increase students' motivation and academic achievement.

Definition of Terms

Several terms are referenced in the help-seeking literature. This section contains the definition of terms used in this study. Several of the terms are used interchangeably as synonyms and are listed below.

Academic help seeking is a general problem-solving strategy and self-regulation learning strategy in which learners cope with academic challenges encountered in the classroom by gathering information from formal and informal sources to acquire knowledge and complete tasks (Newman, 1990).

Achievement goal theory is a motivation theory guided by mastery- and performance-oriented beliefs (Nelson-LeGall, 1984).

Adaptive help seeking includes help seeking that is necessary when students cannot surmount difficulties by themselves and these students desire help that supports understanding and mastery (Stavropoulos, 2007).

Autonomous help seeking is a strategic help-seeking behavior that is student generated after repeated attempts to address the problem have failed. Autonomous help seeking is characterized by requests for hints rather than expedient answers or solutions, and allows the help seeker to maintain independence and autonomy (Butler, 1998). Autonomous help seeking is the same as instrumental help seeking and was measured by three items on the help seeking scales (Karabenick, 2003).

Ego-oriented achievement goals guide student learning that centers on a particular outcome such as a grade or comparison with other students. Ego-oriented students are focused on a particular outcome, grade, or performance level, and students are not interested in learning for the sake of learning. Ego-oriented achievement goals are the same as performance-oriented achievement goals (Karabenick, 2003).

Excessive help seeking occurs when a student's sole effort is to have someone else solve the problems for him or her. Excessive help seekers do not attempt to solve problems by independent means even if it is a problem that they are capable of solving for themselves (Nelson-LeGall & Glor-Scheib, 1986; Nelson-LeGall & Resnick, 1998). Excessive help seeking is used interchangeably with executive and expedient help seeking.

Executive help seeking occurs when students seek help with intentions of having someone else solve the problem or reducing the costs of achievement in terms of time or effort involved (Butler, 1998; Karabenick, 2003). Executive help seeking is used interchangeably with excessive and expedient help seeking.

Expedient help seeking measures the perceptions of students who seek help to succeed without having to work as hard by quickly obtaining answers by any means necessary (Karabenick, 2003). Expedient help seeking is used interchangeably with excessive and

executive help seeking. Expedient help seeking was measured by three items found on the help-seeking scales (Karabenick).

Formal sources of help include institutional sources. Institutional sources of help consist of professors, instructors, teachers, tutors, and study-skill centers (Karabenick, 2003). Formal help seeking was measured by two items found in the help-seeking scales.

General help seeking consists of three items that assess student intentions to seek help. There were three items included in this study and the items were developed by Karabenick (2003).

Help-seeking avoidance is predicted by performance goals (Tanaka, Murakami, Okuno, & Yamauchi, 2002). Help-seeking avoidance occurs when students fail to seek help. Help-seeking avoidance was measured by three items found in the help-seeking scales (Karabenick, 2003).

Help-seeking threat is predicted by performance goals (Ryan, Hicks, & Midgley, 1997). When students display high levels of help-seeking threat, students avoid seeking help. Help-seeking threat was measured by three items found in the help-seeking scales (Karabenick, 2003).

Help-seeking scales consist of seven different measures developed by Wolters et al. (2003). These scales measure general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help from both formal and informal sources. The entire measure consisted of 19 items.

Informal sources of help include noninstructional sources such as classmates, other students, peers, friends, and family members (Karabenick, 2003). Informal sources of help were measured by two items found on the help-seeking scales (Karabenick, 2003).

Inquiry-based instruction is an instructional strategy implemented by science educators that incorporates real-world questions allowing learners to incorporate knowledge and collaborate with peers (Anderson, 2002).

Instrumental help seeking uses independent mastery-oriented efforts to find solutions to academic problems. Instrumental help seeking includes motivational and cognitive components. Instrumental help seeking occurs when individual efforts are ineffective and the help sought is limited to the amount and type needed to solve the problem for themselves (Nelson-LeGall & Glor-Scheib, 1986; Nelson-LeGall & Resnick, 1998). Help designed will aid students in acquiring information or skills necessary to achieve independently and improve the quality of performance (Karabenick, 2003). Students desire help that will lead to finding answers for him or herself for the sake of learning itself (Nelson-LeGall, 1984). Indirect help, clues, and hints are beneficial to students seeking instrumental help. Instrumental help is similar to autonomous help seeking. Instrumental help seeking was measured by three items found on the help-seeking scales (Karabenick).

Intentions to avoid needed help assess how students handle assignments that they do not understand (Wolters et al., 2003). Intentions to avoid needed help is the same as help-seeking avoidance and was measured by three items in the help-seeking scales (Karabenick, 2003).

Mastery-oriented achievement goals guide student learning that is learning centered. Mastery-oriented students are not focused on a particular outcome, grade, or performance, but learn for the sake of learning. Mastery-oriented achievement goals are the same as task-oriented achievement goals (Nelson-Le Gall, 1984).

Metacognitive self-regulation is comprised of planning, monitoring, and regulating. Planning involves setting goals, monitoring involves tracking attention, and, regulating involves fine-tuning and adjusting cognitive activities (Wolters et al., 2003).

Organization strategies require learners actively to cluster, outline, and process main ideas resulting in better academic performance (Wolters et al., 2003).

Perceived costs of help-seeking threat assesses how a student thinks that others will view him or her if he or she asks for assistance (Wolters et al., 2003). Perceived costs of help-seeking threat is synonymous with help-seeking threat and was measured by three items on the help-seeking scales (Karabenick, 2003).

Perceived benefits of help seeking assesses how a student looking for help interprets the goodness that can come from finding and received help (Wolters et al., 2003). Perceived benefits of help seeking is the same as general intentions to seek help and was assessed by three items on the help-seeking scales.

Performance or extrinsic self-talk measures how much a student focuses on a particular outcome, grade, or performance level. Performance or Extrinsic Self-Talk students are not interested in learning for the sake of learning (Wolters et al., 2003).

Performance-oriented achievement goals guide student learning that focuses on a particular outcome such as a grade or comparison with other students. Performance-oriented students focus on particular outcomes, grades, or performance levels, and are not interested in learning for the sake of learning. Performance-oriented achievement goals are the same as ego-oriented achievement goals (Nelson-LeGall, 1984).

Seeking help from formal and informal sources measures a students' preference for help from teachers and people of authority (Wolters et al., 2003) or seeking help from

peers and noninstitutional help sources (Wolters et al.), respectively. Seeking help from formal sources was measured by two items in the separate help-seeking scales. Seeking help from informal sources was measured by two additional items from the help seeking scales (Karabenick, 2003). Seeking help from formal and informal sources is the same as source of help.

Source of help measures a students' preference for help from teachers and people of authority (Wolters et al., 2003) or seeking help from peers and noninstitutional help sources (Wolters et al.), respectively. Seeking help from formal sources was measured by two items in the separate help-seeking scales. Seeking help from informal sources was measured by two additional items from the help seeking scales (Karabenick, 2003). Source of help is the same as seeking help from formal and informal sources.

Task-oriented achievement goals guide student learning that focuses on learning itself. Task-oriented students are not focused on a particular outcome, grade, or performance but learn for the sake of learning. Task-oriented achievement goals are similar to mastery-oriented achievement goals (Nelson-LeGall, 1984).

TIMSS (US Department of Education, 2007) is an international assessment of fourth- and eighth-grade mathematics and science education students in 48 countries. The science topic domains include biology, chemistry, physics, and earth science. The cognitive domains include knowledge, application, and reasoning skills.

Summary

Science classroom environments vary from one classroom to another. One instructional strategy implemented by middle-school science teachers is inquiry-based education. Inquiry-based education influences the achievement goals of middle-school

science students. Achievement goals influence help-seeking attitudes, perceptions, and behaviors of middle-school students. Cognitive processes were measured using achievement measures like science grade and science unit test score. Help seeking attitudes and perceptions were measured by the help-seeking scales (general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help) developed by Karabenick (2003) and Wolters et al. (2003).

The remaining chapters contain a review of the literature providing a foundation for this study, methodology employed in this study, the results to the five research questions obtained in this study, and the discussion, summary of findings, limitations, implications for educational practices, and recommendations for future research drawn from this study.

CHAPTER II

REVIEW OF THE LITERATURE

This chapter elaborates on how adjustments to the middle-school science classroom environment can alter the academic help-seeking attitudes, perceptions, and behaviors of middle-school science students who participated in an inquiry-based educational program. The purpose of this study was to investigate how mastery-oriented achievement goals influenced the help-seeking attitudes, perceptions, and behaviors of middle-school students. Middle-school students completing mastery- and task-oriented inquiry-based activities fostered more general, instrumental, and informal help seeking and discouraged expedient, threat, avoidance, and formal help seeking. This chapter contains segments on academic help seeking in various learning environments, cognitive strategies employed by students during help seeking, instrumental and expedient help-seeking styles, help-seeking threat and avoidance, and source of help. The chapter concludes with the development of the help-seeking scales (general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help) by Karabenick (1988, 2001, 2003) and Wolters, Pintrich, and Karabenick (2003).

The next section provides an operational definition of academic help seeking elaborating on the importance of help seeking by students in middle-school science classrooms.

Academic Help Seeking

An operational definition of help seeking is necessary to understand the multifacets of academic help seeking. Academic help seeking is a general problem-

solving, learning, self-regulation strategy, and social-interactional process in which learners cope with academic challenges by gathering information from formal and informal sources to acquire knowledge and complete learning objectives (Grayson, Miller, & Clarke, 1998; Newman, 1990; Pape & Wang, 2003; Ryan, Gheen, & Midgley, 1998; Wolters et al., 2003; Zimmerman, 2002). Learners demonstrate preferences to seek help from formal sources, like teachers, or informal sources, such as peers (Butler & Neuman, 1995; Karabenick, 1998; 2001, 2003; Pape & Wang). Learners not only possess differing achievement-goal structures dedicated toward help seeking (Butler & Neuman, 1995) but also adopt new attitudes toward help seeking considering previous experiences, self-esteem (Ryan & Pintrich, 1997), and benefits associated with seeking help (Grayson et al.; Karabenick).

Help seeking is an adaptive and strategically beneficial way to solve academic problems encountered in middle-school science classrooms. Efforts to satisfy intrinsic and extrinsic achievement goals (performance, ego, task, or mastery) play a pivotal role in how students address their help-seeking needs subsequently developing a help-seeking style. Achievement goals influence help-seeking styles (Aberbach, Lynch, & Eccles, 1991; Butler, 1998; Butler & Neuman, 1995; Grayson et al. 1998; Kennedy, 1997; Karabenick, 1988, 1998, 2001, 2003; Karabenick & Knapp, 1991; Nelson-LeGall, 1984, 1985, 1989, 1990; Nelson-LeGall & Glor-Scheib, 1985, 1986; Newman & Goldin, 1990; Pape & Wang, 2003; Ryan & Pintrich, 1997; Ryan, Patrick, & Shim, 2005; Stravianopoulos, 2007). There are two contrasting help-seeking styles: expedient and instrumental (Karabenick, 1998, 2003; Nelson-LeGall, 1985; Wolters et al., 2003). Instrumental help seekers are guided by mastery or task goals, whereas expedient help

seekers are guided by performance or ego goals. Expedient or excessive help-seeking solutions include cheating, copying, or doing anything that minimizes effort producing short-term educational gains. Expedient solutions do not decrease learners' dependence on others when faced with a similar problem (Karabenick, 1998, 2003; Nelson-LeGall; Wolters et al.) challenging educators who desire to help students foster into unavoidant, instrumental, strategic help-seekers. In contrast with expedient help seekers, instrumental help seekers look for ways to maintain their autonomy during the help-seeking process. Instrumental help seekers want just enough help to continue to finish solving problems on their own, whereas expedient help seekers want help that allows them to finish the task quickly without a deeper understanding of the subject material. Instrumental help seekers are interested in the process of learning and are able to transfer acquired knowledge to similar situations. Therefore, it is difficult to dismiss the importance that personal, situational, and environmental achievement-goal structures have on students' help-seeking attitudes, perceptions, and behaviors. Table 2 contains the definitions of expedient and instrumental help-seeking styles.

Table 2
Definitions of Help-Seeking Styles

Help-Seeking Style	Definition
Instrumental and Autonomous help seeking	Operate under mastery goals. Look for ways to maintain autonomy. Prefer hints. Desire to be able to transfer knowledge acquired to similar situations. Interested in learning for the sake of learning. Prefers help from formal sources. (Karabenick, 1998, 2003; Nelson-LeGall, 1985; Wolters et al., 2003).
Expedient and Excessive help seeking	Operate under performance or ego goals. Help sought includes cheating, copying, or minimizing effort producing short-term gains. Transfer of knowledge may not occur when faced with similar situation. Displays high levels of help-seeking threat and avoidance. (Karabenick, 1998, 2003; Nelson-LeGall, 1985; Wolters et al., 2003)

Understanding the many aspects of help seeking provides the foundation for the following sections on achievement goals, help-seeking style (instrumental help seeking and expedient and excessive help seeking), help-seeking threat, help-seeking avoidance, and source of help. This next section contains information pertaining to the research that has been conducted in various learning environments building upon the foundation of achievement-goal structures. After achievement goal structures have been established, help-seeking styles develop.

Help Seeking in Various Environments

This section contains the achievement-goal literature and the link between achievement goals and help-seeking styles.

Results from several help-seeking studies have demonstrated that achievement goals influence help-seeking style (Aberbach, Lynch, & Eccles, 1991; Butler, 1998; Butler & Neuman, 1995; Grayson et al. 1998; Kennedy, 1997; Karabenick, 1988, 1998, 2001, 2003; Karabenick & Knapp, 1991; Nelson-LeGall, 1984, 1985, 1989, 1990; Nelson-LeGall & Glor-Scheib, 1985, 1986; Newman & Goldin, 1990; Pape & Wang, 2003; Ryan & Pintrich, 1997; Ryan, Patrick, & Shim, 2005; Stravianopoulos, 2007) and that there are two help-seeking styles (Nelson-LeGall, 1984): instrumental help seeking and expedient help seeking. Achievement goals form the foundation of help-seeking styles. Achievement goals stem from two distinct categories: mastery or performance. Achievement goals are influenced by perceptions of cognitive competence, previous experience, environment, higher levels of help-seeking threat, and higher levels of help-seeking avoidance. Mastery-achievement goals focus on the process of learning, whereas performance-achievement goals focus on ability, outcomes, or comparisons with other

students. Classroom practices like inquiry-based education, commonly implemented in science classrooms, allow middle-school science learners to focus on the process of acquiring science skills and learning rather than promoting performance ability or outcomes (Anderson, 2002).

Butler and Neuman (1995) manipulated attitude and perceptions toward help seeking by altering the directions and varying the goal-focus instructions of a puzzle-solving problem for children in a laboratory setting using 159 Jewish Israeli second and sixth graders. Students were read task-oriented or ego-oriented instructions, and researchers measured the students' type of help requests. When faced with difficulties during the puzzle task, students choose a hint or a solution as help from the researcher. Hints consisted of the researcher prompting students how to get through a difficult part of the puzzle by inserting one puzzle piece. Solutions consisted of the researcher solving the puzzle for the student and then allowing the student to continue on his or her own. Students then continued to solve the remaining problems independently.

After completing all six puzzles, Butler and Neuman (1995) asked students a series of three questions consisting of why they did not ask for help, why other students would not ask for help, and why they did ask for help when they did. Answers for why students did not ask for help were coded into three categories: independent mastery, help was not necessary, or to mask incompetence. A statistically significant result was found for mastery in the task condition, $F(1,147)=20.34$, indicating that more help requests occurred when students operated under mastery goals. Mastery in the task condition produced a large measure of practical importance equaling .88 (Weinberg & Abramowitz, 2006, p.262). Although Butler and Neuman provided information

consistent with what is found in the literature base, their study has some limitations. Butler and Neuman demonstrated that simple directions read before completing a puzzle solving task can influence the goal orientation of students by instructing the participants to follow the task directions allowing students to operate under a certain type of achievement-goal perspective; however, the task that the participants completed is not typical of tasks completed in a middle-school science classroom-learning environment. Furthermore one question raised by this study is how long and into what situations the achievement-goal perspective will be maintained by the students. These limitations question the generalizability of results obtained from this group of Israeli students.

The relationships between classroom learning environments and student self-reports of help-seeking avoidance strategies were investigated by Turner et al. (2002). Turner et al. investigated extrinsic-goal structures found in mathematics classrooms with 1,197 sixth-grade students. Using the Help Avoidance Scales developed by Ryan and Pintrich (1997) and the Patterns of Adaptive Learning Study (PALS) as measures, Turner et al. found that classroom mastery and task goals produced a statistically significant difference for predictors of avoiding help seeking, $t(52)=-3.05$. This difference between groups produced a large $\eta 2$ value of .15 (Green & Salkind, 2008, p.177). Although Ryan et al. (1998) identified a statistically significant result for performance and ability-focused goals, Turner et al. did not find statistical significance with performance goals. Notwithstanding Turner et al.'s results, a large body of research still suggests that promoting performance goals undermines the help-seeking attitudes and perception in a middle-school science classroom that would create more expedient help seekers.

When conducting a quasi-experimental investigation involving 941 fifth- and sixth-grade Israeli students (Butler, 2008) placed students into tracked and untracked mathematics classes. Butler used a translated Hebrew version of the self-reported Motivational Orientations Questionnaire to investigate what makes students believe that they had a productive day in a mathematics class (five items), displayed work avoidance (five items), have ego-approach orientation (four items), and have ego-avoidance orientation (two items). Students rated answers from 1 (*strongly disagree*) to 5 (*strongly agree*). Butler's factor analysis found that intrinsic-goal structures influenced tracked and untracked mathematics students for ego-approach, $F(1,929)=8.67$, and ego-avoid orientations, $F(1,929)=21.62$. These results from the tracked and untracked mathematics students produced small measures of practical importance equaling .03 and .05, respectively. Students in a high-ability track sought help less often than students in the low-ability track, $F(2,929) = 8.28$. This $\eta 2$ was small equaling .02. The results suggested that ability tracking promotes performance-oriented goals in mathematics classes undermining student willingness to seek help from teachers.

Furthermore, Butler (2008) noted student reluctance to seek help as demonstrated by a 2(ability grouping) X 3(achievement level) X 2 (gender) analysis of variance with 931 fifth- and sixth-grade mathematics students, $F(1,192) = 81.69$, $\eta 2= .08$. This measure is of medium practical importance. Ability groupings consisted of tracked and untracked students placed into low-, medium-, and high-ability groupings. Mathematic-achievement levels were assigned by teacher because standardized testing scores were not available to place students into groups objectively. Butler's results suggest that placing students into long-term-classroom-structured-relative-ability groupings

promoting a performance-oriented environment undermines instrumental help-seeking styles while upholding expedient help-seeking styles, whereas placing students into long-term-classroom-structured-mastery-oriented groups establishes a mastery-oriented environment promoting both master-achievement goals and instrumental help seeking. Accentuating mastery-oriented achievement goals promotes instrumental help-seeking styles for middle-school science students.

Ryan, Patrick, and Shim (2005) identified achievement-goal orientation differences in 474 fifth-grade mathematics students. Measures included perceptions of help seeking, achievement-goal orientations, affective experiences, and students' social relationship with teacher. Achievement-goal orientation items were adapted from the PALS, and affective responses were adapted from the Motivated Styles for Learning Questionnaire (MSLQ). Students responded to a self-reported measure on a 5-point scale with anchor points of 1 (*not at all true*) to 5 (*very true*). Students differed in their help-seeking tendencies in their mastery- and performance-avoid goal orientations, $F(2,470)=6.84$ and $F(2, 470)=6.38$, respectively.

These two results produced small measures of practical importance equaling .03 and .03, respectively. Additionally, Ryan et al. learned that mastery goals shared a small, yet positive correlation with mathematics grade in grade 5 and grade 7, $r= .22$ and $r=.18$, respectively. Students with avoidant help-seeking tendencies had lower mathematics grades than students with appropriate help-seeking tendencies in grade 5 and grade 7, $r=-.28$ and $r=-26$, respectively.

Ryan et al. provided research that when students sought help in a mathematics classroom, the students would be more academically successful than students who did not

seek help. One limitation was identified in this study. Ryan et al. focused on help-seeking behavior from the teachers' formal perspective and results cannot be generalized to help-seeking behavior associated with peers. Ryan et al. did indicate that fifth- and seventh-grade students were able to regulate their own help-seeking behavior knowing when help was necessary in order to be successful.

Wolters, Pintrich, and Karabenick (2003) collaborated to create and administer a modified form of the MSLQ to over 1000 students. The modified MSLQ contained 5 mastery-self-talk items, 4 relevance enhancement items, 4 situational interest enhancement items, 4 performance or relative ability self-talk items, 5 performance or extrinsic self-talk items, 4 self-consequating items, and 4 environmental structuring items. Value beliefs measured intrinsic-goal and extrinsic-goal orientations. Intrinsic goals focused on task or mastery goals. Extrinsic-goal orientations measured how much focus on grades and approval from others a student values. Value beliefs included judgments of how interesting, useful, and important the course content was to the student. Cronbach's coefficient alphas were .85, .82, .80, .75, .79, .74, and .74, respectively. Means and standard deviations were not presented in the paper.

Approach orientation combined intentions to seek help, perceived benefits of seeking help, instrumental help seeking, and formal help seeking. Avoidance orientation combined help-seeking threat, intentions to avoid help, and expedient help seeking. Students with the approach orientation were more motivated with higher levels of mastery-approach goal orientation. Students scoring high in help-seeking avoidance were less motivated, more anxious, and had lower mastery-approach orientation values.

Table 3 contains the Motivation beliefs broken down by approach and avoidance orientations from Wolters et al.

Table 3
Motivation Beliefs broken down by Approach and Avoidance Orientations from Wolters et al. (2003)

Motivation Beliefs	Approach Orientation	Avoidance Orientation
Mastery Approach	.45*	-.20*
Mastery Avoid	.05	.31*
Performance Approach	.00	.49*
Performance Avoid	-.12*	.62*
Task Value	.43*	-.20*
Test Anxiety	.02	.22*

*Statistically significant at the .05 level.

The study noted several limitations (Wolters et al., 2003). One specific limitation is that the younger students did not make distinctions between cognitive and metacognitive strategies specifically associated with academic help seeking, and students may have had a hard time accurately answering the items. Another limitation of this study is that because help seeking is a socio-interactional process, academic help seeking is sensitive to learner's perceptions including whether teachers or peers are perceived as willing to provide help and if the environment supports the process of help seeking. This research provided by Wolters et al. asserts help-seeking style is mediated by achievement goals, and students with mastery-achievement goals become more instrumental help seekers whereas student with performance-achievement goals become more expedient help seekers. Similar results should prevail in a middle-school science course.

Kennedy's (1997) investigation involving 907 third graders examined the variables associated with seeking help in social contexts. Kennedy did not obtain a statistically significant result for motivation and any personal characteristic including gender, performance attribution, or competition from peers in his logistic regression

results. Perhaps, Kennedy's results transpired because the students who were used were too young and unable to provide accurate and reliable self-reported data. Unlike third-grade students, eighth-grade science students should be able to provide accurate self-reported data with a comprehensive understanding of the items presented.

The results of the previous seven studies, with the exception of Kennedy (1997), suggest that personal goal-orientation influences help-seeking attitudes, and achievement goals develop over time. Butler and Neuman (1995) and Ryan et al. (1998) proposed that achievement goals can be altered by changing directions and tasks. Therefore, whether students operate as mastery or performance oriented, the research provided by Butler and Neuman (1995) implies that students adopt achievement goals based on their surroundings, suggesting that middle-school students may make adjustments to existing achievement goals. When students possess mastery-oriented views, they tend to be less threatened by help seeking; when students possess performance-oriented goals, they tend to perceive more threat from help seeking.

The next section provides a review of the regulation of cognitive strategies employed by students during help seeking.

Cognitive Strategies Employed by Students during Help Seeking

This section addresses the cognitive strategies used by students during the help-seeking process. Cognition has been assessed using achievement data provided by educators and through the use of ability groupings during investigations.

Nelson Le-Gall (1984) divided 85 third- and fifth-grade students into low- and high-ability groupings while investigating the necessary and unnecessary help seeking that occurs when students were presented with 16 vocabulary words. All students came

from European American middle-class backgrounds. Students identified and matched the meaning to vocabulary words, wrote answers down, and then asked for help from the researcher if they desired help. Low-achieving students asked for more necessary help than high-achieving students, t(36)=35.86, but an insignificant difference was obtained for unnecessary help seeking. This result produced a very large measure of practical importance equaling .97. One limitation was the lack of diversity present in the sample size. The students at grades 3 and 5 were able to regulate their own deficits in learning identifying when to seek needed help. When help was needed, students detected the concern and subsequently sought necessary help. Older eighth-grade students should be able to regulate their own help-seeking behaviors documenting when help is necessary.

Butler and Neuman (1995) investigated the help-seeking perceptions and behaviors of 159 second- and sixth-grade students as the students solved puzzle problems. A 2(goal) X 2(age) X 3(initial performance) analysis of variance (ANOVA) produced a statically significant effect for the interaction between goal condition and initial performance, F(2,148)=4.51, and a statically significant main effect for initial performance F(2, 147)=5.75. These two F values produced medium results of $\eta 2=.06$ and $\eta 2=.07$, respectively. Furthermore, 84% of the students in the ego condition reported not seeking help because they wanted to mask incompetence. Students identified as intermediate on initial performance requested, on average, more help than the students identified as low or high performing on initial performance with statistical significance. Children who performed best on initial trials, but who also asked for early help with puzzles that could not be solved on their own, solved more subsequent puzzles successfully. Regardless of ability and achievement level, students in the Butler and

Neuman study were aware that they needed help on the puzzle-solving task and those students who asked for help early on were able to solve more puzzles successfully. These results indicate that students cognitively are aware of their need for help as evidenced by their initial performance on the task and sought help on subsequent tasks when placed in a mastery-oriented condition. Middle-school students provided with similar situations should display similar help-seeking attitudes, perceptions, and behaviors based on cognitive understanding.

Achievement has been linked with help-seeking style. Ryan et al. (2005) examined the help-seeking attitudes, the achievement-goal orientations, fifth-grade achievement, and seventh-grade achievement of 474 fifth-grade mathematics students who were followed for 2 years. Teachers rated students as avoidant, dependent, and appropriate help seekers. Statistically significant achievement differences were found between avoidants, dependents, and appropriate help seekers when comparing final mathematics grade for fifth grade, $F(2,450)=92.62$, and when comparing fifth-grade standardized mathematics score, $F(2,450)=37.96$, in the Ryan et al. (2005) study. Final mathematics grade for fifth-grade students produced a very large measure of practical importance of .29, and fifth-grade standardized mathematics score produced a large measure of practical importance equaling .14. Statistically significant achievement differences were found between avoidants, dependents, and appropriate help seekers when comparing seventh-grade final mathematics grade, $F(2,387)=31.58$, and when comparing seventh-grade standardized mathematics score, $F(2,387)=26.30$ (Ryan et al.). These two F values produced large ($\eta 2=.14$) and medium ($\eta 2=.12$) measures of practical importance. Academic achievement is dependent upon help-seeking behaviors.

In order to limit the influence of teacher bias, Ryan et al. (2005) analyzed the teacher reports of help-seeking tendencies of the students' fifth-grade achievement level. The results of this analysis suggested that teachers did not identify the low-achieving students with predominantly more inappropriate help-seeking tendencies. The percentage of students broken down by avoidant and inappropriate help-seeking tendencies is listed in Table 4. Similar observations should be made of avoidant help seekers, dependent help seekers, and appropriate help seekers should exist in middle-school science students. Students should seek help only when necessary, regardless of ability level.

Table 4
Percentage of Fifth Graders Identified as Avoidant and Inappropriate Help Seekers by Teachers in the Ryan et al. (2005) Study

Grade	Avoidant help seekers	Inappropriate help seekers
A	2	26
B	21	59
C	42	13
D and F	35	2

Similarly, low- versus high-ability groupings produced statistically significant main effects for achievement when Butler (2008) conducted a quasi-experimental study of 941 Israeli students aged 10 to 12 in tracked and untracked mathematics classes. There were 337 tracked mathematics students, and there were 594 untracked mathematics students. Using a 2 (ability groupings) X 3 (achievement level) X 2 (gender) ANOVA, achievement levels statistically significantly were different for ego approach, $F(2,929)=5.20$ and ego avoidance $F(2,929)=6.61$ in the opposite direction. High-achieving students were more likely to agree that it is more important to demonstrate superior ability, whereas low-achieving students were more likely to report that it was more important to avoid doing worse than others. The ANOVA results generated small eta-squared values of .01 and .02, respectively. Butler's results indicate that middle-

school science students should display high levels of cognitive awareness when seeking help, apparently knowing when to seek help and for what reasons that they seek help.

Moore (2008) surveyed 617 undergraduate biology students who participated in optional help sessions. Moore identified that students with lower grades were more likely to attend help sessions, r=.66, suggesting that students are aware of need will seek the necessary help to be successful. One concern not addressed by Moore is that the 617 students used in study are students had satisfied high-school requirements and were considered successful students. Although the students used in Moore's study are older, research (Butler, 2008; Butler & Neuman, 1995; Ryan et al., 2005) substantiates Moore's results. Students are able to detect deficiencies in learning; students know whey they need help. Middle-school students, similar to younger counterparts, should be able to detect when help is needed and be able to articulate when help was needed.

Statistically significant differences in mastery- and performance-goal orientation and mathematics grade for sixth-grade students, t(62)=-6.95 and a very large measure of practical importance equaling .44 were found by Turner et al. (2002). All items were taken from the PALS. Responses to the survey items ranged from 1 (*not at all true*) to 5 (*very true of me*). The avoiding-help-seeking measure consisted of five items (Cronbach's coefficient alpha = .81) with a mean of 2.13 and SD of .91. The self-handicapping-strategies-measure contained six items (Cronbach's coefficient alpha = .82) with a mean of 1.90 and SD of .85. The avoiding-novelty measure included five items (Cronbach's coefficient alpha = .84) with a mean of 2.99. There was no reported SD for the avoiding-novelty variable. The classroom-mastery-goal-structure measure consisted of six items (Cronbach's coefficient alpha = .75) with a mean of 3.79 and SD of .42. The

classroom-performance-goal-structure measure consisted of five items (Cronbach's coefficient alpha = .82) with a mean of 2.92 and SD of .71.

Differences between avoidant help-seeking style and achievement were obtained by Turner et al. (2002) with 1,197 sixth-grade students; however, data are only presented for 65 of these students. This statistically significant result produced a value of t(62)=-10.05. This result had a large measure of practical importance equaling .62. Similar differences for help-seeking style and achievement for middle-school students are anticipated as measured by science grade, science unit test, and help-seeking style.

Ryan, Hicks, and Midgley (1997) conducted a hierarchical regression using grade point average (GPA), avoidance of help seeking, and threat associated with help seeking. Step 1 of the regression analysis produced a statistically significant inverse relationship between avoidance of help seeking and GPA and between threat and GPA.

In Step 3, Ryan et al. computed a GPA X relative-ability goals interaction and only found a statistically significant result with avoidance of help seeking. These results from Ryan et al. imply that middle-school students with lower cognitive abilities, measured as both science grade and science unit test score, should show higher levels of help avoidance and lower levels of help seeking. Achievement goals appears to be related to the help-seeking avoidance and threat of students and should occur in middle-school science students.

Table 5 contains the results from the hierarchical regression analyses using gender, grade point average, and academic goals to predict help-seeking variables for Ryan et al. (1997).

Table 5
Hierarchical Regression Analyses Using Gender, GPA, Academic Goals, and Social Goals to Predict Help-Seeking from Ryan et al. (1997)

Predictor	Beta A	Beta B	Beta C	R^2
Avoidance of help seeking				
Step 1				.06*
Gender	-.05	.00	.00	
GPA	-.23*	-.23*	-.25*	
Step 2				.20*
Task-focused goals		-.30*	-.31*	
Relative-ability goals		.11*	.10	
Intimacy goals		-.10*	-.10	
Social status goals		.11*	.11*	
Step 3				.21*
GPA x Relative ability goals			-.10*	
Threat associated with of help seeking				
Step 1				.05*
Gender	.09	.12*	.13*	
GPA	-.23*	-.21*	-.21*	
Step 2				.13*
Task-focused goals		-.16*	-.17*	
Relative-ability goals		.17*	.16*	
Intimacy goals		.01	.02	
Social status goals		.13*	.12*	
Step 3				
GPA x Relative ability goals			-.10	.14*

* Statistically significant at the .05 level.

These previous studies (Butler & Neuman, 1995; Moore, 2008; Nelson Le-Gall, 1984; Ryan et al., 1997; Turner et al., 2002) suggest that students are aware of their cognitive abilities during the help-seeking process. Students willingly seek help when they are able to detect a deficit in understanding. Achievement goals combined with cognitive processes influence help-seeking attitudes and perceptions of middle-school science students. The next section examines the studies that have investigated instrumental and expedient help-seeking styles.

Instrumental and Expedient Help-Seeking Styles

Help-seeking intentions can be placed into two distinct styles: instrumental and expedient (Nelson-LeGall, 1989). Instrumental help seekers thrive under situations that maintain autonomy in mastery- or task-oriented situations. Instrumental help seekers can be contrasted with expedient help seekers who look to expedite ways to finish tasks for various reasons including limiting threats to self-esteem, to hide incompetence (Karabenick, 2003), or to just finish the task. Typically expedient help seekers share ability or performance-oriented achievement goals and become anxious or threatened when they have to seek help.

When given the choice of whether to seek help or not, students favor instrumental help rather than expedient help. A preference for instrumental help seeking was observed in Nelson-LeGall's (1989) study of 20 fourth-grade girls and 20 sixth-grade girls. The fourth graders had an average age of 9.9 years, and the sixth graders had an average age of 12.2 years. The sample consisted of predominantly average-achieving, European-American, middle-class girls. The girls were given 10 minutes to solve a puzzle problem in which researchers noted problem-solving behaviors including targeted requests, verbal remarks, directed and nondirected verbal bids for help, and nonverbal behaviors including glances to the adult, facial gestures, and body gestures. A 2 (grade) X 2 (mastery-orientation) X 2 (bidtype) ANOVA was performed. Nelson-LeGall identified a statistically significant bidtype interaction of $F(1,36)=4.05$ and a statistically significant mastery orientation X bidtype interaction, $F(1,36)=5.87$. The first F value produced a medium measure of practical importance equaling .10, and the second F value produced a medium measure of practical importance equaling .14. The girls made more task-focused

bids for help (M=.48) rather than self-focused bids for help (M=.39). Girls identified with high-mastery orientation (M=.74) made more task-focused bids than girls in the low-mastery condition (M=.48). The outcomes proposed by Nelson-LeGall suggest that help-seeking style is influenced by achievement-orientation goals that students operating under high-mastery situations should be more instrumental help seekers in a middle-school science classroom. Furthermore, students participating in an inquiry-based education program that promotes a mastery-oriented environment should solicit more instrumental help-seeking requests.

The results from the Nelson-LeGall (1989) study have been supported by several investigations of instrumental help seeking and mastery-oriented goals. Tanaka, Murakami, Okuno, and Yamauchi (2002) used seven different scales in the investigation. Tanaka et al. used self-reported measures to investigate the influences of achievement goals on self-reported help-seeking behavior. Students responded to items using a 6-point scale with 1 (*not at all true of me*) to 6 (*very true of me*) as anchor points. The 8-item-mastery-goals measure had a Cronbach's coefficient alpha of .90 (mean = 3.49, SD = .09). The 5-item-performance-approach-goals measure had a Cronbach's coefficient alpha of .85 (mean = 3.87, SD = .09). The 7-item-performance-avoidance-goals measure had a Cronbach's coefficient alpha of .82 (mean = 3.06, SD = .08). The 3-item-perceived-benefits-of-help-seeking measure had a Cronbach's coefficient alpha of .78 (mean = 3.94, SD = .10). The 8-item-perceived-threat-from-teachers-and-peers measure had a Cronbach's coefficient alpha of .86 (mean = 2.30, SD = .08). The 3-item-adaptive–help-seeking measure had a Cronbach's coefficient alpha of .67 (mean = 4.27, SD = .09). The 2-item-avoidance–of-help-seeking measure had a Cronbach's coefficient alpha of .56

(mean = 2.30, SD = .08). Achievement-goal scales were comprised of three scales with eigenvalues greater than 1.

Tanaka et al. (2002) examined how Japanese eighth- and ninth-graders' achievement goals and attitudes toward help seeking were related to self-reported help-seeking behavior. Path analysis results reveal that mastery goals were inversely and statistically significantly related to help-seeking avoidance (β= -.29). Students rating high with regard to mastery goals had lower levels of help-seeking avoidance. The researchers did not mention that weak reliabilities for both help-seeking behavior items and use of homogeneous sample were limitations needing to be considered when interpreting results. Table 6 contains the results from the hierarchical regressions examining the attitudes towards help seeking for the junior-high students used the Tanaka et al. (2002) study.

Table 6
Hierarchical Regressions Examining Attitudes toward Help Seeking for 131 Junior-High Students in the Tanaka et al. (2002) Study

Predictor	Beta A	Beta B	R^2
Adaptive help seeking			
Step 1: Achievement goals			.28*
Mastery goals	.17	-.04	
Performance-approach goals	.41*	.32*	
Performance-avoidance goals	-.09	-.01	
Step 2: Attitudes toward help seeking			.41*
Perceived Benefits		.40*	
Perceived Threats		-.17	
Avoidance of help seeking			
Step 1: Achievement goals			.09*
Mastery goals	.16	.29*	
Performance-approach goals	-.36*	-.27*	
Performance-avoidance goals	.10	-.11	
Step 2: Attitudes toward help seeking			.21*
Perceived Benefits		-.21*	
Perceived Threats		.36*	

*Statistically significant at the .05 level.

Tanaka et al. (2002) found that adaptive help seeking was mediated by performance-approach goals and perceived benefits in Step 2 of the regression. Tanaka et al. identified that avoidance of help seeking is mediated by performance-approach goals and by perceived benefits and help-seeking threat in Step 2 of the regression. Tanaka et al. established that the external-goal structures associated with student performance-approach goals were related positively to adaptive-help seeking; however, they found that performance-approach goals were related negatively to avoidance. Additional path analyses revealed that instrumental help seekers saw benefit in seeking help, $\beta = .50$, and tended to be stronger adaptive help seekers, $\beta = .40$. These two results provided by Tanaka et al. accounted for the 38% and 41% of the variation, respectively. Tanaka's data support previous research with regard to mastery goals, however, this performance-approach information provided by Tanaka et al. (2002) appears to contradict other literature (Karabenick, 2003) suggesting that, when eighth- and ninth-grade students either possess or operate under performance-approach goals, eighth- and ninth-grade students tend to avoid help seeking and experience high threat levels when seeking help. This difference could be explained by the age disparity between eighth- and ninth-grade students and college students used by Tanaka et al. and Karabenick, respectively.

These previous three studies suggest that a student's personal- and situational-goal orientation perspective influences help-seeking attitudes and behavior. It must be noted that achievement goals develop over time and are specific to various learning environments. Achievement-goal orientation and cognitive skills of students influence the perceptions and attitudes toward help-seeking styles including instrumental and expedient help seeking. When students possess mastery-oriented views, they tend to

perceive less threat during help seeking; when students possess performance-oriented goals, they tend to perceive more threat during help seeking. Middle-school science students participating in mastery-oriented activities should perceive less threat during help seeking and should not avoid help seeking. Middle-school students who do not participate in inquiry-based activities should show signs help-seeking avoidance and threat, not concerning themselves with efforts to maintain autonomy.

The next section reviews studies that have investigated help-seeking threat and avoidance.

Help-Seeking Threat and Help-Seeking Avoidance

This section contains the relevant literature associated with help-seeking threat and avoidance. The studies presented examined elementary students, high-school students, and college students.

Ryan, Hicks, and Midgley (1997) investigated 443 fifth graders from 12 elementary schools in Michigan. The sample was ethnically diverse consisting of 49% European American, 40.6% African American, and 10.4% Hispanic American students. There were 212 boys and 231 girls. Students completed surveys in their classrooms. The 6-item-task-focused-goals (mean= 3.96, SD= .96) measure had a Cronbach's coefficient alpha of .86. The 5-item-relative-abilitiy-goals (mean= 3.05, SD= 1.07) measure had a Cronbach's coefficient alpha of .75. The 6-item avoidance-of-help seeking (mean= 2.12, SD= .90) measure had a Cronbach's coefficient alpha of .75. The 10-item threat-associated-with-help seeking (mean= 2.12, SD= .90) measure had a Cronbach's coefficient alpha of .75. Grade point average (GPA) was coded from 1=E through 13=A+ and included English, mathematics, science, and social science. The average

GPA was 7.69 with a SD of 2.46. Relative ability goals were positive predictors of help-seeking threat. When students displayed high levels of help-seeking threat, students avoided seeking help, r=.61. This result by Ryan et al. produced a strong correlation. Because students are interested more in outperforming others and in a performance-oriented environment, students are more likely to avoid seeking help, r=.17, and have higher levels of threat, r=.23. Students with task-focused goals displayed lower levels of help-seeking threat (r=-.28) and avoidance (r=-.11) than their performance-oriented counterparts. These two correlation coefficients are moderate and weak, respectively. During times when students focus on mastering academic material rather than focus on masking inability or demonstrating academic ability to others, help-seeking behavior is perceived as an acceptable behavior. Similar results should flourish in a middle-school science classroom that supports task-goals should prevail in which students have lower levels of help-seeking avoidance and threat.

Several studies have demonstrated that threat and avoidance of help seeking are necessary to understand the help-seeking phenomenon. College students responded to scenarios about what they would do if they were not performing as well as they wanted to in college using a 7-point Likert-like scale ranging from 0 (*not at all likely*) to 6 (*definitely*). Karabenick and Knapp (1991) found a weak, yet statistically significant, correlation between total help-seeking strategy and help-seeking threat, r= .11, among 541 undergraduate college students. Karabenick and Knapp identified a weak correlation for help-seeking threat and total help-seeking strategy use for college students. Students experiencing help-seeking threat do not use as many help-seeking strategies. Because middle-school students are younger and have not self-selected themselves or successfully

satisfied high-school graduation requirements to get into college classes yet, the middle-school students, on average, should display higher levels of help-seeking threat and lower levels of total help-seeking strategy use than their college counterparts.

Karabenick (2003) investigated the relationships between mastery-approach, mastery- avoidance, performance-approach, performance-avoidance, and help-seeking orientation of 883 undergraduate students at a large Midwestern university. Students were enrolled in both chemistry and organic chemistry classes. The instrumental-help-seeking scale (two items) had a Cronbach's coefficient alpha of .62 and a mean of 3.5 and SD of .9. The expedient-help-seeking scale (two items) had a Cronbach's coefficient alpha of .78 and a mean of 1.8 and a SD of .9. The help-seeking-threat scale (three items) had a Cronbach's coefficient alpha of .81 and a mean of 2.8 and SD of .9. The help-seeking-avoidance scale (three items) had a Cronbach's coefficient alpha of .77 and a mean of 1.7 and SD of .8.

Correlation coefficient results from Karabenick (1988, 2001, 2003), contained in Table 7, suggested that help-seeking avoidance was moderately correlated with help-seeking threat.

Table 7
Correlation Coefficients between the Help-seeking Components Presented in the Karabenick (1988, 2001, 2003) Studies

Component	Help-seeking threat	Help-seeking avoidance	Expedient help seeking	Instrumental help seeking
Help-seeking avoidance	.69*			
Expedient help seeking	.52*	.54*		
Instrumental help seeking	-.26*	-.39*	-.16*	
Target (Formal help seeking)	.05	.00	.01	.17*

*Statistically significant at the .05 level.

Karabenick (1988, 2001, 2003) identified a weak inverse correlation between threat and help seeking, r =-.19 in 2,039 college students. Additionally Karabenick's

(2001) investigation of 883 chemistry and organic chemistry college undergraduates produced a large positive correlation between threat and avoidance, r=.69.

Expedient help seeking was moderately correlated with both threat and avoidance. Instrumental help seeking was correlated inversely and weakly with threat, was correlated inversely and moderately with avoidance, and was correlated inversely and weakly correlated with expedient help seeking. Formal help seeking was statistically and significantly correlated with instrumental help seeking weakly. These results suggest that middle-school science students should show lower levels of help-seeking avoidance and should perceive less help-seeking threat during help seeking because middle-school students represent a more diverse set of learners who have not self-selected themselves into a performance-oriented environment like college. Additionally middle-school expedient help seekers should show lower levels of threat and avoidance. Middle-school instrumental help seekers should demonstrate low levels of expedient help seeking, help-seeking threat, and help-seeking avoidance.

Tanaka et al. (2002) investigated the relationship between achievement goals and self-reported help-seeking behavior in 131 eighth- and ninth-grade Japanese junior-high school students. Measures included self-reports of a 6-point Likert-like scale ranging from 1 (*not at all true of me*) to 6 (*very true of me*). Results of Tanaka et al.'s path analysis indicated that help-seeking threat was related to avoidance, β=.36, statically and significantly with eighth and ninth graders and that threat was inversely related to adaptive help-seeking, β=-.17. Similar results should be obtained for middle-school science students not withstanding the fact that this study was conducted with a homogeneous group of Japanese students.

Butler (1998) obtained results consistent with Nelson-LeGall (1989), Karabenick and Knapp (1991), and Ryan et al. (1997) in a study examining goal orientation and help avoidance. Butler surveyed 1,029 Israeli 10- to 12-year-olds in mathematics classes. Results allowed Butler to create three factors: students with autonomous strivings for independent mastery, students with ability-focused strivings for masking ability, and students with expedient perceptions that seeking help would not expedite task completion. Butler found statistically significant results between help avoidance and gender, $F(2,2046) = 4.64$ with a very small $\eta 2=.004$, and for the interaction between gender, help avoidance, and expedient perceptions, $F(2,2046) = 11.47$ with a small $\eta 2=.01$. Similar results for middle-school students should prevail with students displaying high levels of help-seeking threat and avoidance with a preference for expedient help seeking.

Ryan et al. (1997) found outcomes similar to Butler's (1998) results that demonstrated the relationship between help-seeking threat and avoidance. Using task-focused items and relative-ability items from the PALS to measure academic goals, avoidance of help seeking developed by Arbreton (1993) and Ryan and Pintrich (1997), and perceived threat items developed by Karabenick and Knapp (1991), Newman (1990), and Newman and Goldin (1990), Ryan et al. found that task-focused goals were related negatively to help avoidance and help-seeking threat in 443 fifth-grade students when regression analyses were conducted. All self-reported measures required students to rate items on a 5-point scale with 1 (*not at all true*) to 5 (*very true*). Avoidance of help seeking referred to instances where children identify that they need help but fail to seek it. Help-seeking threat items measured threat to self-worth. Relative-ability goals were

related statistically to help-seeking threat (Ryan et al., 1997). Ryan et al. found a small positive statistically significant relationship between relative-ability or performance goals and avoidance. Students working under task-focused goals did not appear to avoid help or feel as threatened when seeking help as students who operated under performance- or ego-performance goals. Middle-school science students operating under mastery-oriented goals should produce similar results in middle-school science classrooms. Students should display lower levels of help-seeking threat and avoidance at the middle-school level.

Results from these four studies (Butler, 1998; Ryan et al., 1997; Karabenick, 1988; Tanaka et al., 2002) suggested that help-seeking threat and avoidance perceptions stem from the foundations of achievement goals. Students functioning under mastery goals should display lower levels of help-seeking threat and avoidance, whereas students who are driven by performance goals show higher levels of threat and avoidance.

The next section addresses the interaction between students and their sources of help, including teachers and peers.

Help-Seeking Source

Once students have decided to seek help, students face two main options for finding help in a school setting: seeking help from a formal source like a teacher or seeking help from an informal source like a peer. Classroom activities and structures influence the help-seeking attitudes, perceptions, and behaviors including source of help (Nelson-LeGall & Glor-Scheib, 1985). Furthermore, differences between formal and informal sources have been established by Karabenick and Knapp (1991). This section includes a survey of the literature associated with sources of help available for students.

Nelson-LeGall and Glor-Scheib (1985) investigated the help-seeking tendencies of first-, third-, and fifth-grade students' instructional time during class-task, recitation, and recitation-task activities. Class-task time was defined as students engaged in previously assigned activities such as completing worksheets or tests in either small-group or individual time. Recitation was defined as teacher directed activities. Recitation-task was defined as time in which students were the initiators during specific tasks.

Results obtained from Nelson-LeGall and Glor-Scheib (1985) suggested that students sought the most help while participating in recitation-task during mathematics, $F(2,28) = 5.26$ with a large measure of practical importance equaling .28, and while participating in class-task during reading, $F(2,28)=13.21$ with a large measure of practical importance equaling .49. Activity structure affected help-seeking rates by grade level in mathematics. Fifth graders sought more help during recitation-task time than in other activity structures, $F(2,27)=3.75$ producing a large effect size equaling .22. The students in the Nelson-LeGall and Glor-Scheib study were given group time allowing students to initiate their own help-seeking behavior. Middle-school science students who partake in task activities that allow them to interact with the material, as demonstrated by Nelson-LeGall and Glor-Scheib (1985), should develop more instrumental help-seeking behaviors when activities are paired with mastery-oriented achievement goals of both formal and especially informal sources of help.

Karabenick and Knapp (1991) found statistically significant differences between formal and informal sources, $t(610)=4.50$, in 612 college students as measured by the help seeking scales. This result produced a small measure of practical importance

equaling .03. Karabenick and Knapp's investigations produced positive correlations between total strategy use of cognitive skills and informal sources (r=.28) and formal sources (r=.31). Karabenick and Knapp found students are more likely to engage in instrumental activities designed to help one perform better rather than seek help from informal sources, lower aspirations, and alter goals, $F(4,2444)=2406.4$. This F value produced a very large $\eta 2= .94$. This result indicated that students with strong self-regulation skills over their own behavior seek help from either a formal or informal source (Karabenick & Knapp) because they know that help is needed. Middle-school science students motivated by mastery-oriented achievement goals should seek help more frequently from either formal or informal sources.

These previous two studies investigated the threat, avoidance, and strategy use associated with seeking help from various sources. Students in the Nelson-LeGall and Glor-Scheib study were able to initiate their own help-seeking behaviors during recitation-task and class-task time. Students in the Karabenick and Knapp (1991) study with strong regulation skills monitored their own behavior and sought help when necessary from either a formal or informal source. Therefore, middle-school science students involved in mastery-oriented educational activities should adopt instrumental help-seeking attitudes and perceptions lowering levels of threat, increasing number of help-seeking requests from either formal or informal sources by regulating their own help-seeking needs.

This next section focuses on the different ways that researchers have used to measure the various aspects of help seeking.

Measuring Help Seeking

Researchers devised several instruments to measure help seeking (Bembenutty, 2006; Karabenick, 1988, 2001, 2003; Karabenick & Knapp, 1991; Marchand & Skinner, 2007; Newman & Goldin 1990; Tanaka et al., 2002). Instruments focused on general help-seeking intentions, instrumental help seeking, expedient help seeking, avoidance of help seeking, and help-seeking threat (Ryan et al., 1997; Ryan & Pintrich, 1997; Ryan et al., 2001; Tanaka, et al,; Turner et al., 2002; Wolters et al., 2003). This section elaborates on the measurement instruments that have been used to measure help seeking.

Karabenick (1988, 2001, 2003) studied the academic help seeking of 2,039 and 883 college students enrolled in various college courses. In addition to using the 107-item MSLQ questionnaire that used a 5-point scale to assess the values, achievement goal orientations, and regulation strategies, Karabenick (2001) studied help seeking using five help-seeking scales that assessed instrumental help seeking, formal help seeking, help-seeking threat, help-seeking avoidance, and expedient help seeking. The help-seeking measure only contained 13 items.

The correlations between the help-seeking components suggested that help-seeking threat was correlated moderately with avoidance and expedient help seeking and correlated negatively with instrumental help seeking. Help-seeking avoidance was correlated moderately with expedient help seeking and correlated negatively with instrumental help seeking. Expedient help seeking was correlated weakly and negatively with instrumental help seeking. Formal help seeking was correlated with instrumental help seeking weakly. The correlations between the help-seeking components obtained from Karabenick (1988, 2001) are presented in Table 7.

Research completed by Karabenick (2001) provided statistically significant correlations between the five scales. These data were gathered from 883 chemistry and organic chemistry undergraduate students. This group of students had a mean age of 20.4 years. Fifty-one percent of the participants were female. These students from this study were considered high achieving and ability with a mean Scholastic Aptitude Test (SAT) mathematics scores of 677 and a mean verbal score equaling 634. High-school student grade point average was 3.87, whereas college grade point average was 3.34. Statistically significant correlations suggested a strong relationship between threat and avoidance, r= .69. Results indicated a statistically significant correlation between expedient help seeking and both threat and avoidance. Instrumental help seeking was correlated negatively with threat, avoidance, and expedient help seeking. Formal help seeking was statistically significant, yet weakly related to instrumental help seeking. Because the sample in this study contained all students who had satisfied high-school graduation requirements, slightly different correlations are anticipated because all middle-school students must take the same science program. The middle-school students used in this study are more ethnically and academically diverse than the students used in Karabenick's study.

In 2003, modifications were made to the five scales initially created by Karabenick, (1988). The revised help seeking measure consisted of three general intentions to avoid needed help items, perceived costs of help-seeking (threat) items, instrumental (autonomous) help-seeking, expedient help-seeking goal items, formal source (teachers) items, and informal source (other students) items (Wolters, Pintrich & Karabenick, 2003).

The Wolters et al. (2003) investigation produced information on six different measures: a 4-item help-seeking threat measure (Cronbach's coefficient alpha = .84, mean = 1.5, SD = .7), a 3-item help-seeking avoidance measure (Cronbach's coefficient alpha = .69, mean = 1.7, SD = .7), a 3-item expedient-goal measure (Cronbach's coefficient alpha = .64, mean = 1.9, SD = .8), a 3-item instrumental-goal measure (Cronbach's coefficient alpha = .61, mean = 3.5, SD = .8), a 2-item formal-source measure (Cronbach's coefficient alpha = .88, mean = 3.1, SD = 1.0), and a 2-item informal-source measure (Cronbach's coefficient alpha = .87, mean = 3.1, SD = 1.0). Wolters et al. examined the strategies for the regulation of academic motivation of 114 junior-high-school students. Wolters et al. (2003) administered the help-seeking scales during this investigation, although specific reliabilities are not provided for junior-high-school students. Wolters et al. added two additional help-seeking scales while disaggregating the source of help variable into two parts. Students operating under an approach help-seeking orientation had a positive correlation with perceived teacher support, r=.40, whereas students working under an avoidance help-seeking orientation had a negative correlation with perceived teacher support, r=-.24. Both correlations were statistically significant and moderate. Middle-school students with high levels threat and avoidance will avoid seeking help from either formal or informal source; middle-school students with low levels of help-seeking threat and avoidance willingly will pursue seeking help from either formal or informal sources.

Help-seeking intentions rest on several key components that begin with motivation and achievement goals established in classroom environments by the individual. Achievement goals are perpetuated by teachers in the classroom. Teachers

can promote mastery- and task-oriented achievement goals during classroom educational activities by providing students with inquiry-based activities. Student help-seeking intentions are regulated by cognitive processes and develop within in the individual over time. Because mastery-oriented education has benefits to cognitive processes, help-seeking intentions should benefit from participating in this type of an educational program in middle-school science classes. Help-seeking behaviors and attitudes depend upon how individuals perceive threat from various sources leading individuals to either seek help or avoid seeking help. If students do not believe they are as anxious when they need to seek help and if students are operating under mastery-achievement goals, then middle-school students should foster into instrumental help seekers because students should not be as threatened when forced to seek help from peers and teachers.

Summary

This chapter contained information on achievement goals, cognitive strategies used by students during help seeking, instrumental and expedient help seeking, help-seeking threat, help-seeking avoidance, source of help, and how academic help seeking has been measured and assessed. Teachers influence eighth-grade students achievement goals established within the classroom environment changing students' personal achievement goals. Achievement-goal orientations are subdivided into the performance-approach, performance-avoidance, mastery-approach, and mastery-avoidance orientations (Tanaka et al., 2002). Students regularly change achievement goals depending on the situations and environments that they are placed in (Butler, 2008). Students are able to detect deficits in understanding regardless of cognitive and academic achievement. Regardless of achievement level, students know to seek help when they need it. When

students possess mastery-oriented achievement-goals views, attitudes and perceptions of help seeking are changed. Eighth-grade students' help seeking includes general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help (Karabenick, 2003). Help seeking attitudes and perceptions are guided by varying directions and instructional strategies (Butler & Neuman, 1995) used in science classrooms. Students operating under mastery-oriented goals show a preference for instrumental help seeking, lower preference for expedient help seeking, lower levels of help-seeking threat, and lower levels of help-seeking avoidance when participating in mastery-oriented tasks and directions. Therefore, influencing student achievement goals by providing students with mastery-oriented directions combined with inquiry-based education allows students to develop stronger mastery-approach achievement goals with a preference for instrumental help seeking, lower levels of help-seeking threat, and lower levels of help-seeking avoidance. Students with instrumental help-seeking tendencies should show increases in achievement because the students will seek help in order to increase understanding.

The next chapter contains the methodology broken down by research design, general characteristics of the sample, location of the sample, protection of human subjects, procedures, treatment, instrumentation (help-seeking scales, demographic data, student science classwork checklist, student homework checklist, and help-seeking student-teacher observation sheet, pilot study, restatement of the research questions, and data analysis methods.

CHAPTER III

METHODOLOGY

Previous investigations of academic help seeking do not provide a complete picture of the cognitive and help-seeking attitudes, perceptions, and behaviors that middle-school students use to cope with academic and strategic help-seeking issues they encounter in an inquiry-based science classroom setting. Inquiry-based education combined with mastery-oriented directions and reflective questioning strategies in a middle-school science classroom have a beneficial effect on middle-school science students' help-seeking attitudes, perceptions, and behavior. The researcher provided middle-school students with a treatment consisting of mastery-oriented inquiry-based education combined with an academic help-seeking education program in an attempt to better address students' help-seeking needs creating more instrumental and less expedient, mastery-oriented help seekers. Therefore, the purpose of this study was to investigate how mastery-oriented inquiry-based education influences the help-seeking attitudes, perceptions, and behaviors of middle-school students.

This chapter includes and addresses the research design that was employed in this study, location and sample of the participants in this study, and the protection of human subjects procedures. This chapter also contains descriptions about the five instruments that were used to collect help-seeking attitude, perception, and behavior data from the students. Instruments included the help-seeking scales (general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help), the demographic information sheets, the student science classwork-checklist sheet, the homework-checklist sheet, and the student-teacher group-

level observation sheet. Last, this chapter presents information concerning the treatment, data analyses, and information about the pilot test.

Research Design

The research design employed was a pretest-posttest design. Student attitudes, perceptions of help seeking were assessed before and after middle-school students participated in an inquiry-based education program using physics activities with mastery-oriented directions and focus questions for the duration of a 5-week instructional unit. Additionally middle-school students' help-seeking behaviors were assessed during the 5-week instructional unit. Help-seeking attitudes and perceptions were assessed by the help-seeking scales developed by Karabenick (2003) and Wolters, Pintrich, and Karabenick (2003). The help-seeking scales included general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help. Help-seeking behaviors were assessed during instructional and homework time using self-reports of student behavior. Students completed daily in-class student classwork checklist and a student homework checklist in addition to completing regular in-class and out-of-class assignments to assess help-seeking behavior tendencies. The researcher collected achievement data comprised of science grade and unit test score to assess the effectiveness of the inquiry-based educational program. Demographic data were collected in order to complete additional analyses.

The study had 123 eighth-grade students participate in a mastery-based inquiry-based educational unit with mastery-oriented directions and focus questions. The identities of the 123 students remained anonymous as students were identified by numbers only. All students participated in a treatment consisting of examples of

appropriate help seeking. All students received daily reminders about appropriate help-seeking practices. All students received explicit directions and instructions on what are appropriate ways to seek help consisted of. The transcript that was read to students is provided in Appendix A. Figure 1 contains the events and measures used in this study.

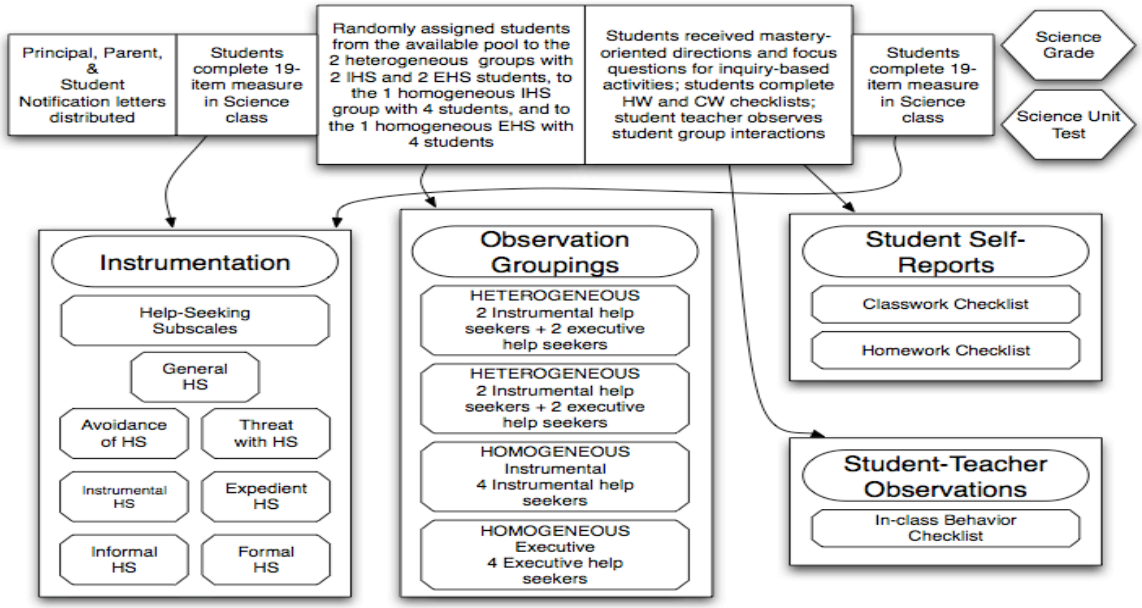

Figure 1. Schematic of the events and measures used in this study.

Quantitative data were gathered to investigate the help-seeking attitudes, perceptions, and behaviors before and after participating in a mastery-oriented inquiry-based educational unit. Quantitative data included students' help-seeking attitudes, perceptions, self-reported in-class help-seeking behaviors, and self-reported homework help-seeking behaviors. Quantitative data also included cognitive achievement assessed using science grade and science unit test. Help-seeking attitudes and perceptions were assessed using the 19-item help-seeking scales (general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help) at the beginning and the conclusion of the 5-week unit during the science class.

The research questions used mastery-oriented inquiry-based education and a treatment of helping students develop appropriate help-seeking practices as independent variables. The research questions used general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help scales (Karabenick, 2003; Wolters et al., 2003), self-reported homework help seeking, and self-reported classwork help seeking as dependent variables. Additionally, homework study time, final grade, unit test score, gender, free or reduced lunch, English Language Learner (ELL), class period were additional variables used in this study.

All students completed a daily student classwork checklist and a daily student homework checklist in addition to completing regular in-class and out-of-class assignments in order to assess help-seeking behaviors. The classwork- and homework-checklist sheet are located in Appendix B.

After obtaining the initial help-seeking scores from the pretest for the instrumental and expedient subscales, all 123 students were identified as either high instrumental help seekers, high expedient help seekers, or neither. In order to designate students as high instrumental, high expedient, or neither, an instrumental help-seeking scale score and expedient help-seeking scale score were created by summing the scores from the three items from the respective scales. Students with scores greater than 14 were considered high on that particular subscale. The cut-off score of 14 was imposed by the researcher and was two-thirds of the total maximum score of 21. Students could not be high on both subscales to be considered for these groupings. If students were high on either the instrumental scale or the expedient scale only, they were placed into the available pool from which student groupings were created. The students were identified

as either high instrumental help seekers, high expedient help seekers, or neither. Sixteen students were placed into a group of either four homogeneous instrumental help seekers, four homogeneous expedient help seekers, or a heterogeneous group consisting of both two instrumental and two expedient help seekers. Four students were selected from the available pool for the homogeneous instrumental help-seeking group. Four students were selected from the available pool for the homogeneous expedient help-seeking group. Four instrumental and four expedient students were selected from the available pool for the heterogeneous help-seeking group; two selected instrumental students were paired with two selected expedient students forming two heterogeneous groups consisting of four students each.

Qualitative data were obtained by the student teacher weekly during instructional activities using the student-teacher observation sheet located in Appendix C to examine group-level help-seeking behaviors of the students who were placed into the groupings. Although the students self-reported their help-seeking tendencies, the group-level observations made by the student teacher were compared with the help-seeking self-reports of the students.

General Characteristics and Location of the Study Sample

Location and a description of the participants are included in this section. Descriptions about the 123 participants enrolled in this school site include standardized test scores, socioeconomic data, and ethnicity data. A separate description about the 16 students participating in the student groupings is included also.

The particular middle school was a high-performing school. The Academic Performance Index (API) for the 2007-2008 school year for this school was 823. The

API for the 2008-2009 school year is an 829. The Standardized Testing and Reporting (STAR) for the California Standards Test (CST) breakdowns are provided for the 2007-2008 school year. The students take STAR CST tests each school year in eighth grade in the Spring. These tests included English Language Arts, Mathematics, Science, and History-Social Studies. The STAR CST was a multiple-choice test that students enrolled in California schools take each year after completing approximately 80% of the school year.

The school served 690 students in the seventh and eighth grades. Information provided in the 2007-2008 School Accountability Report Card (SARC) by the school district indicates that the average seventh- and eighth-grade science class size contains 28.7 students for this school site. Furthermore, according to the 2007-2008 SARC, there are 11 eighth-grade Science classes with an average of 33 students enrolled in each class. This study included 4 of the 11 classes.

Ethnicity break down consisted of the following components: Asian American (35%), Hispanic or Latino American (25%), Filipino American (22%), European American (not Hispanic; 11%), African American (4%), Pacific Islander (1%), and American Indian or Alaska Native (0.43%), Multiple or No Response (2%). The school was economically diverse reporting 41% socioeconomically (SES) disadvantaged.

These subgroups scores are reported in Table 8 for the 2007-2008 and 2008-2009 academic years. Table 8 also includes the STAR CST scores broken down by males and females as well as socioeconomic status (SES), English language learners (ELL), and students with learning disabilities (SpEd). Table 8 contains the STAR CST scores broken down by student ethnicity meeting or exceeding the state standards for the 2007-2008

testing period and the STAR CST scores broken down by student ethnicity meeting or exceeding the state standards for the 2008-2009 school year. This middle school hosted an ELL program, explaining why it reported 20% ELL population. The school also served students with learning disabilities (10%).

Table 8
Percentage of Eighth-Grade Students Scoring Proficient or Advanced from the 2007-2008 and 2008-2009 STAR CST for English Language Arts (ELA), Mathematics (MAT), Science (SCI), and History Social Science (HSS) Broken Down by Student Ethnicity, Gender, SES, English Language Learners, and Students with Learning Disabilities

	Percentage of Students Scoring Proficient or Advanced for the 2007-2008 STAR CST				Percentage of Students Scoring Proficient or Advanced for the 2008-2009 STAR CST			
Group	ELA	MAT	SCI	HSS	ELA	MAT	SCI	HSS
African American	50	29	41	36	50	29	64	50
Asian American	78	80	78	72	-	-	-	-
Chinese American	-	-	-	-	81	83	87	86
Filipino American	55	50	57	46	59	43	63	65
Hispanic or Latino American	37	30	43	-	37	15	37	31
Pacific Islander	42	67	-	60	57	43	57	71
European American	66	48	76	52	81	81	81	91
Vietnamese American	-	-	-	-	70	80	76	80
Male	56	54	65	58	58	46	70	69
Female	64	56	60	-	60	47	60	59
SES-Economically Disadvantaged	47	45	50	21	46	31	53	52
ELL-English Language Learners	20	28	37	-	16	19	45	33
SD-Students with Disabilities	26	24	30	-	36	26	48	40

The state of California only disaggregates data for ethnic subgroups with 50 or more students enrolled on the first day of STAR testing who make up at least 15% of the total population or for groups with 100 or more students enrolled on the first day of testing (cde.gov). If there were fewer than 50 students in a particular subgroup, then the scores for that particular subgroup were not reported in the school-wide data. Students in

a subgroup with fewer than 50 students only received individualized information. Yearly changes in the size of the significant subgroups determine whether the information is reported for that subgroup each year.

Although parents of students declined to have their children complete the questionnaires, students participated in the assigned treatment program because the science material presented was assessed on the STAR CST in the Spring of 2010.

This school site was structured into academic teams. Students were placed randomly into one of five academic teams in the summer before the school year begins. There were two eighth-grade teams, two seventh-grade teams, and one combination team that hosted the English language learners (ELL) students. One seventh- and one eighth-grade team hosted special education (SpEd) students. This decision to house SpEd students in a single team was made originally to help both SpEd students and teachers by increasing collaboration with a fewer number of teachers to help students be successful. This study's sample did not include SpEd students. There are seven ELL students enrolled in the four classes that were used in this study. Every attempt was made to balance males and females during the random assignment of students to four classes at the beginning of the school year. High-achieving, average-achieving, and low-achieving students were assigned randomly to the four classes at the beginning of the school year as well. Therefore, the four classes for the students were comparable in this composition.

The regular school day ran from 8:30 a.m. to 3:00 p.m. The regular school day was divided into six academic periods plus an advisory period on Mondays, Tuesdays, Thursdays, and Fridays. Each period on a regular school day was 50 minutes long. Minimum-day Wednesdays were divided into six academic periods with no advisory

period. The minimum day ran from 8:30 a.m. to 1:20 p.m. Each period on a minimum day was 40 minutes long. Minimum days allowed for teacher collaboration time.

A convenience sample consisting of 123 eighth-grade students enrolled in four class periods was used for this study. Table 9 contains the frequencies for each class period and the time of class period for the 123 participants in this study and the time of day that the class period occurred.

Table 9
Number of Students Broken Down by Class Period and Time of Class Period for 123 Students

Class Period	Time of Class Period	Total *f*	Total %
1	8:50 - 9:45 a.m.	27	22
2	9:49-10:40 a.m.	30	24
3	10:54-11:45 a.m.	31	25
4	1:14 - 2:04 p.m.	35	28

Eighth-grade science students were not tracked into either ability groupings or subject-matter specialty classes providing an academically and culturally diverse subject group. Students were enrolled in a culturally diverse middle school in a small unified school district in the San Francisco Bay area. There were more male participants than female participants in each of the four class periods. The ethnicity breakdown was fairly consistent across all four periods with Asian American having the largest frequencies. Three of the four classes contained all of the students reporting free or reduced lunch.

The Hispanic- or Latino-American and the Asian-American students reported spending, on average, the most time on homework outside of class; however, the Hispanic- or Latino-American students had the most variation. The European-American and the Pacific-Islander students reported spending the least amount of time on homework outside of class, on average. The Asian-American and European-American

students had the highest final grades, whereas the Hispanic- or Latino-American students had the lowest final grades, on average. As presented in Table 10, students in the four classes do not differ in terms of demographics and ability.

Table 10
Frequencies of Participants for Gender, Ethnicity, Free or Reduced Lunch, and English Language Learners Broken Down by Class Period for 123 Students

	Period 1		Period 2		Period 3		Period 4	
Demographic	*f*	%	*f*	%	*f*	%	*f*	%
Gender								
Male	16	60	16	53	17	55	19	54
Female	11	40	14	47	14	45	16	46
Ethnicity								
Asian American	11	41	14	47	12	39	12	34
Filipino American	8	30	6	20	5	16	8	23
Hispanic American	3	11	1	3	3	10	3	3
African American	2	7	2	7	3	10	1	3
Pacific Islander	0	0	1	3	0	0	4	4
European American	0	0	2	7	1	3	1	3
Other	3	11	4	13	7	23	6	17
Free or Reduced Lunch								
Yes	7	26	8	27	8	26	10	29
No	20	74	22	73	23	74	25	71
ELL								
Yes	0	0	1	97	4	13	2	6
No	27	100	29	3	27	87	33	94

The males reported slightly larger homework time, had higher unit test grades, and had higher final grades than the females had, on average. Table 10 contains the frequencies of participants for gender, ethnicity, free or reduced lunch, and English Language Learners for each of the four class periods.

Socioeconomic status (SES) was determined by receiving Free or Reduced Lunch services, and these students who use the Free or Reduced Lunch service are considered low SES, whereas those who do not use the service are considered high SES. On average, low SES students reported spending more time working on homework than those in the high SES category; however, the high SES students had more variation than

did the low SES students. On average, high SES students had higher test grades and final grades than did the students low SES students.

Table 11 contains the means and standard deviations for grade, average unit test score, and homework study time broken down by gender, ethnicity, free or reduced lunch, and English Language Leaner for all 123 students.

Table 11
Average Grade, Average Unit Test Score, HW Study Time, and Demographic Characteristics of 123 Eighth-Grade Science Students Broken Down by Gender, Ethnicity, Free or Reduced Lunch, and ELL for 123 Students

	HW Study Time		Unit Test Grade		Final Grade	
Demographic	*M*	*SD*	*M*	*SD*	*M*	*SD*
Gender						
Male	1.68	2.26	78.28	13.14	82.49	13.34
Female	1.63	1.56	75.11	14.50	80.27	14.08
Ethnicity						
Asian American	1.97	2.49	82.98	9.79	89.47	8.33
Filipino American	1.25	0.65	75.41	14.40	77.67	15.47
Hispanic or Latino American	2.22	2.85	67.40	16.62	73.00	10.92
African American	1.25	1.25	76.63	14.24	81.00	9.96
Pacific Islander	0.87	1.04	71.00	16.81	75.20	15.64
European American	0.94	1.13	81.25	6.19	82.00	13.14
Other	1.69	1.73	69.25	14.32	73.05	14.70
Free or Reduced Lunch						
Yes	2.16	2.99	75.76	13.11	80.61	12.90
No	1.48	1.41	77.27	14.09	81.82	13.99
ELL						
Yes	2.28	2.06	84.14	7.29	87.43	11.77
No	1.62	1.97	76.42	13.99	81.14	13.71

There were only seven English Language Learners (ELL) students who participated in this study accounting for some of the results. On average, the ELL students reported spending more time on homework than the native English speakers did. On average, the ELL students had higher test grades and final grades with smaller variation than the native English speakers had.

Table 12 contains homework study time, unit test grade, and final grade for the 123 participants broken down by class period. The information in Table 12 suggests that there the means do not differ for either homework study time, unit test grade, or final grade suggesting that the four classes can be compared and combined for future analyses.

Table 12
Homework Study Time, Unit Test Grade, and Final Grade for the 123 Eighth-Grade Students Broken Down by Class Period

Class Period	HW Study Time		Unit Test Grade		Final Grade	
	M	*SD*	*M*	*SD*	*M*	*SD*
1	1.43	0.73	77.78	11.66	78.22	11.72
2	1.40	2.83	77.57	11.38	83.60	12.81
3	1.67	1.30	74.90	15.50	80.23	13.88
4	2.03	2.25	77.29	15.89	83.34	15.41

Understanding the sample that was being used for this study was necessary in order to appropriately understand the help-seeking attitudes, perceptions, and behaviors of middle-school students. The previous section addressed the reasons that make this sample unique.

Student Grouping General Characteristics

Four of the five research questions focus on the student groupings. Therefore, it is important to understand the academic and help-seeking profiles of the 16 students. There were four groups: one homogeneous instrumental group, one homogeneous expedient group, and two heterogeneous groups. Although the groups consisted of students who spent the 5-week intervention period together, the groups were created initially based on help-seeking style. Therefore, the general characteristic information presented on these students is broken down by help-seeking style and group membership.

The homogeneous expedient group had the reported spending the least amount of time for homework study, whereas the heterogeneous expedient students reported

spending the greatest amount of time for homework study, on average. The highest unit-test scores and final grades belonged to the homogeneous instrumental group, whereas the lowest unit-test scores and final grades belonged to the homogeneous expedient group, on average. From a cognitive standpoint based on the unit test and final grade, there was a difference between the homogeneous expedient students and the rest of the students who participated in the student groupings. The homogeneous expedient students also reported spending less time participating in study time. Table 13 contains average study time, unit test score, and final grade for the randomly selected available pool for homogeneous instrumental, homogeneous expedient, heterogeneous instrumental, and heterogeneous expedient students broken down by help-seeking style and group membership. Each group contained four students.

Table 13
Average Study Time, Unit Test Score, and Final Grade for the Homogeneous Instrumental, Homogeneous Expedient, Heterogeneous Instrumental, and Heterogeneous Expedient Students Broken Down by Help-Seeking Style and Group Membership

	Study Time		Unit Test		Final Grade	
Group	*M*	*SD*	*M*	*SD*	*M*	*SD*
Instrumental Homogeneous	0.9	0.6	85.7	12.8	86.5	13.1
Expedient Homogeneous	0.1	0.1	56.3	11.3	55.8	10.7
Instrumental Heterogeneous	1.5	1.0	74.5	16.3	84.3	12.3
Expedient Heterogeneous	1.8	1.7	80.5	3.0	84.5	7.1

The instrumental homogeneous group had the highest instrumental scores, whereas the lowest scores belong to the heterogeneous expedient students at pretest, on average. The instrumental heterogeneous students had the highest instrumental scores, whereas the expedient students had the lowest instrumental scores at posttest, on average. The homogeneous expedient students had the highest expedient scores, whereas the heterogeneous instrumental students had the lowest expedient scores at pretest and

posttest, on average.

Table 14 contains the pretest and posttest scores for the instrumental and expedient help-seeking scores for the homogeneous instrumental, homogeneous expedient, heterogeneous instrumental, and heterogeneous expedient students broken down by student help-seeking style and group membership.

Table 14
Pretest and Posttest Scores for the Student Groupings for Instrumental and Expedient Help-Seeking Scores for the Homogeneous Instrumental, Homogeneous Expedient, Heterogeneous Instrumental, and Heterogeneous Expedient Students Broken Down by Student Help-Seeking Style and Group Membership

	Instrumental				Expedient			
	Pretest		Posttest		Pretest		Posttest	
Group	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Instrumental Homogeneous	17.5	1.7	16.8	2.9	11.3	5.2	8.5	4.8
Expedient Homogeneous	14.0	1.6	7.8	3.6	18.5	2.7	14.0	4.4
Instrumental Heterogeneous	16.3	0.9	18.0	2.2	9.5	4.1	6.0	4.2
Expedient Heterogeneous	10.5	4.4	15.5	2.9	14.3	0.5	12.5	5.2

The highest pretest help-seeking threat scores belonged to the homogeneous expedient students, whereas the lowest pretest help-seeking threat scores belonged to the instrumental homogeneous students, on average. The highest pretest help-seeking avoidance scores belonged to the homogeneous expedient students, whereas the lowest pretest help-seeking avoidance scores belonged to the instrumental heterogeneous students, on average.

The highest posttest help-seeking threat scores belonged to the homogeneous expedient students, whereas the lowest posttest help-seeking threat scores belonged to the instrumental heterogeneous students, on average. The highest posttest help-seeking avoidance scores belonged to the homogeneous expedient students, whereas the lowest posttest help-seeking avoidance scores belonged to the instrumental heterogeneous students, on average. As suggested by their expedient label, the homogeneous expedient

students displayed the highest levels of help-seeking threat and help-seeking avoidance on both the pretest and posttest. Table 15 contains the pretest help-seeking threat, posttest help-seeking threat, pretest help-seeking avoidance, and posttest help-seeking avoidance scores broken down by help-seeking style and group membership.

Table 15
Pretest and Posttest Help-Seeking Threat and Help-Seeking Avoidance Summary Scores for the Homogeneous Instrumental, Homogeneous Expedient, Heterogeneous Instrumental, and Heterogeneous Expedient Students Broken Down by Help-Seeking Style and Group Membership

	Help-Seeking Threat				Help-Seeking Avoidance			
	Pretest		Posttest		Pretest		Posttest	
Group	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Instrumental Homogeneous	9.0	3.4	9.0	2.9	8.3	4.3	9.3	5.3
Expedient Homogeneous	17.0	3.3	9.8	4.5	15.3	3.6	16.0	3.8
Instrumental Heterogeneous	9.3	2.2	8.0	3.7	5.8	3.4	4.0	1.4
Expedient Heterogeneous	12.5	3.7	9.3	0.5	12.8	6.7	8.5	3.1

Table 16 contains the pretest and posttest scores for general help seeking, formal help seeking, and informal help seeking for the four students in each of the homogeneous instrumental, homogeneous expedient, heterogeneous instrumental, and heterogeneous expedient students broken down by help-seeking style and group membership.

Table 16
Pretest and Posttest Summary Scores for General Help Seeking, Formal Help Seeking, and Informal Help Seeking for the Students for Homogeneous Instrumental, Homogeneous Expedient, Heterogeneous Instrumental, and Heterogeneous Expedient Students Broken Down by Help-Seeking Style and Group Membership

	Pretest		Posttest		Pretest		Posttest		Pretest		Posttest	
	General HS				Formal HS				Informal HS			
Group	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Instrumental Homogeneous	17.3	3.5	16.3	4.1	6.8	2.2	6.8	0.9	11.8	2.9	10.8	2.8
Expedient Homogeneous	13.8	4.4	16.0	5.3	8.3	1.3	11.0	3.2	10.5	3.0	11.5	2.5
Instrumental Heterogeneous	10.0	2.3	5.8	3.6	8.8	3.9	4.3	2.9	12.0	2.8	7.8	4.2
Expedient Heterogeneous	8.8	3.0	16.5	2.9	5.0	1.8	6.3	2.6	9.5	2.9	11.5	1.7

The previous section contained the general characteristics for all 123 students, and the general characteristics for the 16 students who participated in the student groupings. The next section contains the protection of human subjects.

Protection of Human Subjects

The study complied with the standards set by both the American Psychological Association (2002) and the standards set by the University of San Francisco Institutional Review Board. Permission from the University of San Francisco's Institutional Review Board Protection of Human Subjects was obtained. Permission to conduct the research at the school site was obtained from the school-site principal and student teacher in written form.

Parent permission to participate in this study was given upon students returning the completed Letter of Parent Permission located in Appendix D. Students of parents who declined participation in the study were directed to read an article on light for each of the assessment periods. The reading was supplied with the questionnaire packet distributed to every student in the class setting ensuring anonymity with regard to parental permission as students were labeled by identification number only.

Letters describing the project were provided to the school-site principal, the student teacher present in the room, and parents. These letters are located in Appendix D. Permission from the principal to conduct this investigation was obtained. Positive parent permission was obtained if parents wanted their child to participate in the study. Letters were sent home with students describing the nature of the study. Parents were instructed to have their child return the signed permission slip to the child's science teacher. If parents had questions, they were instructed to contact the researcher. Letters to parents

were distributed to the students during the school day and were returned to the researcher on the following school day. There were 137 students on the teacher's roll sheets. The teacher received 123 positive permission slips from parents. The researcher received a 90% response rate because some parents declined to have their child participate; therefore data were not collected from 10% of the students who were assigned to the teacher's roll sheets. All 137 students participated in the treatment because the information covered during instructional time was presented on the STAR CST test later during the 2010 school year.

Both options of completing and not completing questionnaires were presented to parents on the permission slip, allowing for student anonymity. A parent could either check the option that allowed his or her child to complete or not complete questionnaires anonymously in this study. In order to maintain anonymity of who was participating and who was not participating, students not completing the help-seeking questionnaire were given an alternate reading assignment provided in each test packet that was distributed at the time of the test. The researcher followed several procedures to ensure the protection and anonymity of human subjects. Only the researcher knew which students were completing questionnaires, identifying participating students by a number only.

Students were told that completing the questionnaire for the study was voluntary and that if, at any point, they wanted to stop, they could do so without penalty to his or her science grade. Pretest and posttest student letters are located in Appendixes E and F, respectively. Students were told that the purpose of the questionnaire was to find out about students' attitudes and perceptions about their attitudes toward science and that this is a chance for them to express their opinions about the subject matter. Students were

told also that help-seeking behaviors would be assessed during class and homework assignments. Students were assured that the information in the questionnaire as well as their help-seeking behaviors would be kept anonymous and would only be known by their identification number.

Permission to participate in the student groupings was granted on the original permission slip located in Appendix D. The help-seeking attitudes, perceptions, and behaviors of the 16 students who participated in the student groupings remained confidential and were only known to the researcher. Help-seeking attitudes and perceptions were assessed using the help-seeking scales, and help-seeking behaviors were assessed using the self-reported classwork- and homework-checklist sheets. Additional group-level observations were made of the 16 students and were made weekly.

All questionnaires, student demographic data, and student achievement data were kept in a secured locked cabinet. The Student Information Sheet and Researcher's Information sheet are located in Appendixes G and H, respectively, and were used to collect student name, ethnicity, age, free or reduced lunch status, and ELL status. Permission to use the help-seeking scales was provided via electronic mail from the author; however, permission was not obtained from the author to include the help-seeking questionnaire in the appendix of the dissertation.

Procedures

This section contains the procedures that were used in this study. Procedures complied with both university and school-site regulations.

Permission to conduct this research at this school site was obtained from the principal. The researcher obtained permission to conduct research in her own classroom

from the school-site principal. All four classes were taught by the researcher. One-hundred-thirty-seven permission slips were distributed to eighth-grade science students in the Winter of 2010. Students in four eighth-grade science class periods received permission slips to participate. These permission slips were taken home, reviewed, and signed by parents. The students kept one copy and returned the other signed copy to the researcher. The researcher collected 123 permission slips during the week following distribution. The remainder of parents declined to have their child participate. Students had the opportunity not to complete the instrument if they so desired. In order to maintain anonymity of which parents and students chose to participate, a reading assignment was supplied in the questionnaire packet distributed to every student in the class setting. Students were able to choose to complete discretely the reading assignment instead of taking the questionnaire without penalty to their grades.

One-hundred-twenty-three students completed the help-seeking scales (general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help).

The mastery-oriented inquiry-based instructional unit lasted 5 weeks. In the Spring of 2010, students completed the help-seeking scales during a 50-minute science class period. If a student was absent on either day that the instrument is administered, then he or she completed the measure on the date of his or her return without penalty to his or her grade. If students were absent during the treatment, they received any missed assignments and worksheets and were caught up by the teacher upon the day of return. The attendance rate for the students was 97.9% during the 5-week intervention period.

At the beginning of the treatment, students received instructions about what was considered appropriate and inappropriate help seeking. The transcript read to the students is located in Appendix A. Students were reminded before beginning to work on the daily lesson about what were considered appropriate and inappropriate help-seeking strategies. Students provided examples of what were appropriate and inappropriate help-seeking strategies. Appropriate examples of help seeking included providing a section title from the textbook or notebook, a page number from the textbook or notebook, a clarifying question, clarifying answer to a peer, or reminding students to use resources present in the classroom or on the board. Inappropriate examples of help seeking included copying from a peer or asking for the answer to a problem.

As part of the students' daily in-class and homework assignments, students completed a checklist of how often they accessed various sources of help. Students were asked about how often they accessed various sources of help from the previous night's homework at the beginning the class period, and students were asked about how often they accessed various sources of help during the class period at the end of the class period. The classwork sources of help consisted of help sought from peers, teacher, Internet, textbook, and personal notebook. The homework sources of help consisted of help sought from peers, teachers, family members, Internet, textbook, and personal notebook. Students listed the number of times they accessed help from peers, teacher, Internet, textbook, and personal notebook for in-class activities and the number of times they accessed help from peers, teachers, family members, Internet, textbook, and personal notebook for homework activities. These various categories were summed to create the

number of times that the source (peers, teachers, family members, Internet, textbook, and personal notebook) was used during the 5-week intervention period.

A mastery-oriented inquiry-based instructional model was followed during the 5-week intervention period. Mastery-oriented inquiry-based education practices commonly used by science teachers allow students to learn guided by task goals focusing on tasks and the learning process (Anderson, 2002; Eylon & Linn, 1988). The inquiry-based educational assessments used in this research project allowed students to have classroom experiences that mimicked real-world problems and incorporated real-world problems and phenomenon. The inquiry-process used in this project included mastery-oriented tasks, engaging students by incorporating oral and written discourse (Anderson). The assignments used in this research project aided in the progress of students' process skills, enhanced academic performance, and developed ability (Mattheis & Nakayama, 1988). The teacher guided students to answers using authentic questions generated by student experiences (Anderson). Mastery-oriented inquiry-based activities called for collaboration among students (Anderson). When students collaborated with other students and teachers, students engaged in academic help seeking. All attempts to provide students with a well-structured experience were made; however, middle-school students were still provided with appropriate guides and scaffolds. The mastery-oriented inquiry-based lessons were not considered completely true inquiry because scaffolds and guides were provided for students. The benefits for not using complete inquiry included supporting the needs of all students, especially ELL, SpEd, and low-achieving students. Sample lessons are included in Appendix I.

At the conclusion of the 5-week mastery-oriented inquiry-based educational unit, students completed the 19-item help-seeking scales (general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help) during another 50-minute science class period.

The procedures for the student groupings initially were based on the pretest instrumental and expedient help-seeking summary score subscales. After obtaining the initial help-seeking scores from the pretest for the instrumental and expedient subscales, all 123 students were identified as high instrumental help seekers, high expedient help seekers, or neither. In order to designate students as high instrumental, high expedient, or neither, an instrumental help-seeking scale score and expedient help-seeking scale score were created by summing the scores from the three items from the respective scales. Students with scores greater than 14 were considered high on that particular subscale. The cut-off score of 14 was imposed by the researcher and was two-thirds of the total maximum score of 21. Students could not be high on both subscales to be considered for these groupings. If students were high on either the instrumental scale or the expedient scale only, they were placed into the available pool from which student groupings were created. From this available pool of students, a total of 16 students were selected randomly and placed into a group of either four homogeneous instrumental help seekers, four homogeneous expedient help seekers, or a heterogeneous group consisting of both two instrumental and two expedient help seekers. The identity of students participating in the student groupings was confidential and known only to the researcher.

The identified and selected high instrumental and high expedient students participated in one of the four treatment groups in the Winter of 2010. In order to assign

the groups to the four class periods, the four class periods were written on separate pieces of paper and placed into a container. Heterogeneous group was written on two separate pieces of paper and homogeneous instrumental and homogeneous expedient were written on two separate pieces of paper and placed in another container. One piece of paper was drawn from each separate container and paired up creating a period and treatment pairing.

This process produced four treatment groups with four students in each group. Two groups with four students each were assigned randomly to a heterogeneous group consisting of two students with self-reported high-instrumental help-seeking tendencies and two students with self-reported high-expedient help-seeking tendencies; one group of four students that was assigned randomly to a homogeneous instrumental grouping consisting of four students with self-reported high-instrumental help-seeking tendencies; one group of four students that was assigned randomly to a homogeneous expedient grouping consisting of four students with self-reported high-expedient help-seeking tendencies.

Four students were selected from the available pool for both the homogeneous instrumental help-seeking group from the first-class period. Two instrumental and two expedient students were selected from the available pool for the second-class period. Additionally, two instrumental and two expedient students were selected from the available pool for the third-class period. Four expedient student were selected from the available pool for the fourth class period. The remaining students in the classroom were randomly seated throughout the classroom and were not grouped in any particular manner.

Qualitative data were obtained by the student teacher weekly during instructional activities using the observation sheet to examine group-level help-seeking behavior (general help seeking, instrumental help seeking, expedient help seeking, formal help seeking, and informal help seeking) of the students who were selected were placed into the groupings. Although students self-reported their help-seeking tendencies using the classwork- and homework-checklist sheets, the group-level observations made by the student teacher were compared with the help-seeking self-reports of the students. Observations were made on these four groups by the student teacher weekly.

The four observed groups were seated in the classroom where the student teacher could make group-level observations of the student groupings without interfering with the group interaction. The student teacher sat in a chair at a separate table that was about two ft away where she was able to both see and hear the students during class-work time while she was taking notes about the student grouping's help-seeking interaction and behaviors. The identities of the students in the four observed student groupings were confidential.

The student teacher made weekly group-level observations about student groupings using the observation sheet located in Appendix C. The student teacher made group-level observations of student help-seeking behavior during class to assess the students' help-seeking behavior while the students worked on their lessons. This observation sheet contained items examining student help-seeking behavior that occurred when students collaborated during inquiry-based education. Once a week, the student teacher identified the number of times that students in the group asked someone for assistance, asked for help to learn to solve problems independently, asked for help from

another student, asked for help to quickly obtain answers without understanding, and asked for help from a teacher. Help sought to learn to solve problems and find answer by him- or herself consisted of looking at the board, in the textbook, or using the students' notebook to obtain help or answers. Because the student teacher had been an active presence in the classroom since the beginning of the school year, students still sought help from the student teacher. Therefore, she was unable to take notes every day. The student teacher was able to take notes weekly for all four class periods.

Treatment

For this investigation, four classes containing 137 students participated in a mastery-oriented-inquiry-based education. Permission to participate was only obtained from 123 students.

Inquiry-based lessons presented students with realistic problems that required students to produce a procedure to solve the problem, identify which variables were to be collected, and create tables and graphs independently (Anderson, 2002). The inquiry-based lessons used in this study required students to create their own products discussing their ideas and conclusions throughout the class period while seeking both instrumental and expedient help when necessary. The science unit activities included two topics that eighth graders struggle with: motion and forces. The materials and lessons were adapted from the school district's approved materials list for student use. The mastery-oriented inquiry-based lessons were not considered complete inquiry because scaffolds and guides are provided for students. Furthermore, daily lessons differed providing students with a variety of activities and methods of instructions. Sample lessons are included in Appendix I.

After introducing all students to appropriate help-seeking strategies, all students completed the same mastery-oriented inquiry-based activities. To reinforce the appropriate help-seeking strategies, students were provided with inquiry-based mastery-oriented education task directions. These instructions were adapted from Butler and Neuman (1995) and instructed students as follows: "This is an interesting investigation which will let students learn how to conduct and perform scientific investigations, even difficult and challenging investigations. As students complete these investigations, they can learn how to do the necessary steps acquiring the necessary knowledge and how to improve as they perform different investigations. If you ever need help, you can ask for help from either your teacher or a peer."

In order to assess the help-seeking behaviors of the students participating in this study, students were asked to list how often they accessed various sources of help. Students were asked about how often they accessed various sources of help from the previous night's homework at the beginning the class period and students were asked about how often they accessed various sources of help from the class period at the end of the class period. Sources of help included peers, teachers, family, Internet, textbook, and personal notebook. The classwork- and homework-checklist sheet is located in Appendix B.

A typical 50-minute class period began with students identifying which California State Standards that they addressed for that day and classroom specific announcements. Students then completed a warm-up activity that previews what prior knowledge students have about a particular subject or reviews what material was addressed on the previous day. This warm-up session was known to the students as an IN activity. The IN activity

lasted between 3 and 5 minutes. Students completed THROUGH activities. THROUGH activities included a scientific education that contains inquiry-based activities, content-specific readings, completing assessments, taking notes, and completing worksheets. THROUGH activities lasted between 25 and 40 minutes. Sometimes THROUGH activities carried over to the next Science class period. Class generally concluded with the OUT activity. The OUT activity contains extension questions or reflective questions. OUT activities lasted between 5 and 30 minutes and may be completed outside of the class. This process is called the ITO. After completing assignments, students in this class tape their completed work into a spiral notebook to use for further reference. Sample lessons inquiry-based lessons are included in Appendix I.

The unit was to be implemented over a 4-week time frame; however, due to classroom pacing schedules, a school-wide earthquake and fire drill, and school-wide student-led conference preparation and the student-led actual conferences, the unit took 5 weeks to complete. There were several disruptions that interfered with the pacing of instruction. There was an earthquake that required evacuation for approximately 15 minutes during one class period. The school held student-led conferences during the week of the intervention, resulting in 4 consecutive minimum-day schedules. Furthermore, one 50-minute science class period involved students preparing for the student-led conferences halted instruction on this particular date. These types of disruptions created discrepancies in the pacing schedule. Although all care was taken to ensure that the program followed the pacing guide, some changes did occur during the course of the data collection, and any changes or discrepancies were noted. The pacing guide is presented in the Lesson Plan Outline for Inquiry-Based Unit in Appendix J.

The study was conducted during February and March of 2010. There were no school holidays or vacations during this time period. This time period was selected because the vacations influence the retention of information for students providing students with continuity of presented material.

A student teacher was in the classroom completing a check-off sheet ensuring that treatment fidelity during the four class periods ensuring that all four classes received the same help-seeking directions, inquiry-based lessons, and mastery-oriented instructions. The notes indicated that all classes received the same treatment consisting of inquiry-based lessons and help-seeking strategy lessons.

The student teacher's notes also indicated that the student groupings were different across the four class periods. There were 16 students who participated in an additional treatment because the students were arranged in groups of four. The first class had a homogeneous grouping of four instrumental students; the second class had a heterogeneous grouping of two instrumental students and two expedient students; the third class had a homogeneous grouping of two instrumental students and two expedient students; and, the fourth class had a homogeneous grouping of four expedient students. The four groups, one homogeneous-instrumental, one homogeneous-instrumental, and two heterogeneous groups, participated in an additional treatment because of the confidential groupings that occurred. Group-level observations were made of these 16 students.

In order to assess the help-seeking behaviors of the 16 students participating in the groupings, they were asked to list how often they accessed various sources of help. Students were asked about how often they accessed various sources of help from the

previous night's homework at the beginning the class period and about how often they accessed various sources of help from the class period. Sources of help included peers, teachers, family, Internet, textbook, and personal notebook. The classwork- and homework-checklist sheet is located in Appendix B.

This section presented the details of the treatment that all of the students participated in the period and the treatment. This next section contains the details of the instrumentation that was used in this study.

Instrumentation

One quantitative instrument was used in this study: the help-seeking Scales (Karabenick, 2001, 2003; Wolters, Pintrich, & Karabenick, 2003). The help-seeking scales were used as a pretest and posttest to assess general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help. Permission to use the scales for this research project was obtained from the author of the help-seeking scales via electronic mail. There were 19 items in the help-seeking scales.

Additional demographic data including ethnicity, gender, age, and achievement as measured by the science unit test and science grade were collected. The classwork- and homework-checklist sheets to record student self-reported behavior are included in Appendix B. The student teacher observation sheet to record student behavior is located in Appendix C. The student information sheet that was used in this study is included in Appendix G.

Help-Seeking Scales

Achievement goals form the foundations for help-seeking attitudes and perceptions (Nelson-LeGall, 1984). This section contains the background, development, scales, range of scores, score interpretations, and reliability and validity for the help-seeking scales.

The six help-seeking scales developed by Karabenick (2001) were subjected to the statistical and psychometric analyses gathered from a sample of 883 undergraduates in chemistry and organic chemistry courses. Measures consisted of instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help. Students responded to survey items on a 5-point scale with anchored statements of *not at all true* to *completely true*. Students were enrolled in undergraduate chemistry courses at a large Midwestern university. There were 883 students who participated in the second wave collection over the course of a semester. Fifty-one percent of the participants were female. Participants had a mean age of 20.4 years. Neither the range of scores nor factor analyses results were provided with the help-seeking measures. Karabenick's (2001) results were provided for five measures: instrumental help seeking (two items, mean = 3.5, SD = .9), expedient help seeking (two items, mean = 1.8, SD = .9), help-seeking threat (three items, mean = 1.8, SD = .9), help-seeking avoidance (three items, mean = 1.7, SD = .8), and formal help seeking (three items, mean = 2.8, SD = .9). The Cronbach coefficient alpha values for the five measures were .62, .78, .81, .77, and .66, respectively.

An inspection of the help-seeking scales suggested that the items target the construct of help seeking; however, weak Cronbach's coefficient alphas were

acknowledged by Karabenick (2001). Table 17 contains correlation coefficients between the help-seeking components presented in Karabenick (1988, 2001, 2003).

Table 17
Correlation Coefficients between the Help-seeking Components Presented in Karabenick the (1988, 2001, 2003) Studies

Component	HS threat	HS avoidance	Expedient HS	Instrumental HS
HS avoidance	.69*			
Expedient HS	.52*	.54*		
Instrumental HS	-.26*	-.39*	-.16*	
Target (Formal HS)	.05	.00	.01	.17*

*Statistically significant at the .05 level.

The information contained in Table 17 suggests that help-seeking avoidance was correlated moderately with help-seeking threat; expedient help seeking was moderately correlated with both threat and avoidance; instrumental help seeking was correlated inversely and weakly with threat, was correlated inversely and moderately with avoidance, and was correlated inversely and weakly with expedient help seeking; and formal help seeking was correlated statistically and significantly with instrumental help seeking weakly.

These correlational results are consistent with theory. Students who avoid help seeking probably do so because they experience high levels of threat associated with help seeking (Butler, 1998; Karabenick, 2003; Karabenick & Knapp, 1991; Ryan, Hicks, & Midgley, 1997; Tanaka, Murakami, Okuno, & Yamanaka, 2002). Students who seek help for expedient reasons including cheating, copying, are more interested in completing work just to complete it and not for the sake of learning (Karabenick, 1998, 2003; Nelson-LeGall, 1985; Wolters et al., 2003). Instrumental help seekers are interested in mastering material and learning and should be weakly and negatively correlated with threat (Karabenick, 1998, 2003; Nelson-LeGall, 1985; Wolters et al., 2003). Instrumental

help seekers should not perceive as much threat when seeking help especially when seeking help from formal sources (Nelson-LeGall & Glor-Scheib, 1985).

Modifications made to the original five help-seeking subscales created by Karabenick (1988) are presented in both Karabenick (2003) and Wolters et al. (2003). The source of help variable was aggregated into two parts. This new measure consisted of help-seeking threat, help-seeking avoidance, expedient help seeking, instrumental help seeking, formal source, and informal source producing a 17-item survey. Wolters et al.'s research included 114 mainly European American, middle-class or working-class families of junior-high-school students. An inspection of the items from the Wolters et al. (2003) study suggested that the items are targeting the construct of help seeking. The researcher was not able to locate any published studies containing factor analyses on the help-seeking scales. Bembenutty (2006) obtained similar results with preservice teachers.

The Likert scale was traditional (*strongly disagree* = 1 to *strongly agree* = 7) for all seven help-seeking scales. The 3-item general help-seeking scale was designed to measure students' intentions to seek help. The 3-item instrumental help-seeking scale was designed to measure students' intentions to seek only instrumental help. The 3-item expedient help-seeking scale was designed to measure students' intentions to only seek expedient help. The 3-item help-seeking threat scale was designed to measure students' perceptions of help-seeking threat. The 3-item help-seeking avoidance scale was designed to measure students' intentions to avoid help seeking. The 2-item formal help-seeking scale was designed to measure students' intentions to seek help from a formal

source. The 2-item informal help-seeking scale was designed to measure students' seek help from an informal source.

Table 18 contains the means, standard deviations, and Cronbach's coefficient alphas for the Karabenick (2003) study as well as the means, standard deviations and Cronbach's coefficient alphas for this study.

Table 18
Means, Standard Deviations, and Cronbach's Coefficient alphas for Karabenick's (2003) Results and Current Study Results for the Help-Seeking Scales

		Karabenick's 2003 Results			Current Study's Results					
					Pretest			Posttest		
Scale	Items	*M*	*SD*	α	*M*	*SD*	α	*M*	*SD*	α
General HS	3	3.4	0.1	.77	4.9	0.30	.57	5.1	0.30	.80
Instrumental HS	3	3.5	0.9	.65	5.3	0.20	.34	5.3	0.20	.75
Expedient HS	3	2.0	0.9	.73	3.3	0.50	.55	2.8	0.30	.75
HS Threat	3	1.7	0.8	.72	3.6	1.00	.55	3.2	1.00	.53
HS Avoidance	3	1.8	0.8	.73	2.8	0.50	.72	2.5	0.50	.68
Formal HS	2	2.9	1.1	.87	4.4	0.10	.89	4.3	0.04	.72
Informal HS	2	3.1	1.0	.90	5.1	0.04	.91	5.4	0.01	.88

The Pearson product-moment correlation coefficients from the pretest summary for 123 students are consistent with previous results (Karabenick, 2003) suggesting that different constructs were measured when controlling the overall error rate at the .05 level. General help seeking had a statistically significant moderate positive correlation with instrumental help seeking and had a statistically significant weak positive correlation with formal help seeking. General help seeking had a statistically significant weak negative correlation with help-seeking threat and had a statistically significant moderate negative correlation with help-seeking avoidance.

Table 19 contains the Pearson product-moment correlation coefficients obtained from the pretest summary scores.

Table 19
Pearson Product-Moment Correlation Coefficients Obtained from the Pretest Summary Score for the General Help-Seeking, Instrumental Help-Seeking, Expedient Help-Seeking, Help-Seeking Threat, Help-Seeking Avoidance, Formal Help-Seeking, and Informal Help-Seeking Subscales

Scale	Pre General	Pre Instru	Pre Exped	Pre Threat	Pre Avoid	Pre Form	Pre Inform
Pre Instrumental	.50*						
Pre Expedient	-.26	-.30*					
Pre Threat	-.11	-.14	.28*				
Pre Avoidance	-.51*	-.56*	.45*	.38*			
Pre Formal	.29*	.43*	.23	.07	-.32*		
Pre Informal	.09	.02	.31*	.03	.05	-.38*	
Gender	.00	.08	-.29	-.09	-.11	.03	.02

*Statistically significant at the .05 level.

Instrumental help seeking had a statistically significant negative correlation with expedient help seeking and a statistically significant moderate negative correlation with help-seeking avoidance; however, instrumental help seeking had a statistically significant positive correlation with formal help seeking. Expedient help seeking had a statically significant positive moderate correlation with help-seeking threat, had a statistically significant positive moderate correlation with help-seeking avoidance, and had a statistically significant weak correlation with informal help seeking. Help-seeking threat had a statistically significant weak positive correlation with help-seeking avoidance. Help-seeking avoidance had a statistically significant negative correlation with formal help seeking. Last, formal and informal help seeking had a weak, yet statistically significant negative correlation. These pretest scores included general help-seeking, instrumental help-seeking, expedient help-seeking, help-seeking threat, help-seeking avoidance, formal help-seeking, and informal help-seeking subscales.

Demographic Data

The final measure consisted of demographic data obtained from school-generated

reports and student responses obtained during the questionnaire and the information is contained in Table 20.

Table 20
Homework Study Time, Unit Test Grade, Final Grade, and Frequency Broken Down by Ethnicity for 123 Participating Students

	HW Study Time		Unit Test Grade		Final Grade		Total	
	M	*SD*	*M*	*SD*	*M*	*SD*	*f*	%
Gender								
Male	1.68	2.26	78.28	13.14	82.49	13.34	68	55
Female	1.64	1.56	75.11	14.50	80.27	14.08	55	45
Ethnicity								
Asian American	1.97	2.49	82.98	9.79	89.47	8.33	49	40
Filipino American	1.25	0.65	75.41	14.40	77.67	15.47	27	22
Hispanic or Latino American	2.22	2.85	67.40	16.62	73.00	10.92	10	8
African American	1.25	1.25	76.63	14.24	81.00	9.96	8	7
Pacific Islander	0.87	1.04	71.00	16.81	75.20	15.64	5	4
European American	0.94	1.13	81.25	6.19	82.00	13.14	4	3
Other	1.69	1.73	69.25	14.32	73.05	14.70	20	16

Demographic information included ethnicity, gender, and age. Achievement was measured by science unit test score and science grade. The final analysis consisted of 123 students with an age range from 13 to 15 years. The average age of the 123 students was 13.3 years. The information contained in Table 20 suggests that the largest number of students belonged to the Asian American and Filipino American categories, and the smallest number of students belonged to Pacific Islander and European American categories. Students self-reported ethnicity, gender, and age. The researcher gathered science unit score and science grade from the office administration. The self-report student-information sheet is included in Appendix G. The researcher's data collection sheet is included in Appendix H.

Both the males and females who participated in this study, on average, reported nearly identical time spent completing homework outside of class; however, the males had more variation than the females did. On average, the males had slightly higher test grades than the females did, and the females had more variation than the males did. On average, the males' final grade was slightly higher than the females' final grades, with the females having slightly higher variation than the males did. On average, the Hispanic- or Latino-American and the Asian-American students reported spending the most time on homework outside of class; however, the Hispanic- or Latino-American students showed the most variation. The European-American and the Pacific-Islander students reported spending the least amount of time on homework outside of class, on average. The Asian-American and European-American students had the highest test grades, whereas the Hispanic- or Latino-American and Pacific-Islander students had the lowest test grades, on average. The Asian-American and European-American students had the highest final grades, whereas the Hispanic- or Latino-American students had the lowest final grades, on average.

Student Science Classwork Checklist and Student Science Homework Checklist

Students responded to the classwork-checklist sheet located in Appendix B to assess help-seeking behaviors. Students responded to the following question, "How many times do you ask for help from the following sources with science during the class period?" Response choices include the following sources: *peer, teacher, Internet, textbook, and personal notebook*. The students completed the student science class checklist at the end of the class period to assess the number of times they accessed science help during the class period. Student responses consisted of a number that could

range from 0 to infinity. Table 21 contains the summed total number of student-self-reported help-seeking bids made in class and at home, means, and standard deviations during the 5-week instructional unit broken down by peer, teacher, family, Internet, textbook, and personal notebook for 123 participating students.

Table 21
Help-Seeking Summed Self-Reported Requests for Classwork- and Homework-Checklist Sheets Broken Down by Minimum, Maximum, Mean, and Standard Deviation for the 5-WeekStudy for 123 Participating Students

Summary Score	Minimum	Maximum	*M*	*SD*
CW Peer	0	85	19.67	15.84
CW Teacher	0	27	5.54	6.12
CW Internet	0	3	0.07	0.37
CW Textbook	0	35	5.90	5.73
CW Notebook	0	8	0.24	1.10
HW Peer	0	42	5.16	6.47
HW Teacher	0	10	0.95	2.01
HW Family	0	15	1.37	2.90
HW Internet	0	15	1.11	2.18
HW Textbook	0	23	1.77	3.96
HW Notebook	0	10	0.95	1.1.10

The most self-reported help-seeking requests for classwork were made of peers and of the textbook, whereas the lowest self-reported help-seeking requests were made of the Internet and personal notebook.

More help-seeking bids were reported during class activities than during homework activities. The most self-reported help-seeking requests for homework were made of peers and textbook. Students reported making more informal help-seeking bids from peers and family members than from formal sources including teacher, textbook, and personal notebook. More technology requests for help occurred outside of the classroom because not all students had access to the computer lab during class time. Total number of help-seeking bids (peer, teacher, family, Internet, textbook, and personal

notebook), means, and standard deviations for 123 students results are contained in Table 22.

Table 22
Total Number of Help-Seeking Bids Observed, Means, and Standard Deviations of Student Self-Reported Help-Seeking Bids during the 5-Week Unit Broken Down by Peer, Teacher, Family, Internet, Textbook, and Personal Notebook for 123 Students for Homework and Classwork

	Help-seeking Bids per Student	
Source of Help	Homework	Classwork
Peer		
Total Number of Help Seeking Bids	42.0	85.00
M	5.2	19.70
SD	6.5	15.80
Teacher		
Total Number of Help Seeking Bids	10.0	27.00
M	1.0	5.50
SD	2.0	6.10
Family		
Total Number of Help Seeking Bids	15.0	0.00
M	1.4	0.00
SD	2.9	0.00
Internet		
Total Number of Help Seeking Bids	15.0	3.00
M	1.1	0.10
SD	2.2	0.40
Textbook		
Total Number of Help Seeking Bids	23.0	35.00
M	1.8	5.90
SD	4.0	5.70
Personal Notebook		
Total Number of Help Seeking Bids	10.0	8.00
M	1.0	0.02
SD	2.0	1.10

The most self-reported help-seeking requests for all 123 students were made of peers and family members whereas the lowest self-reported help-seeking requests were made of the Internet and personal notebooks. Students responded to the student homework checklist located in Appendix B to assess their help-seeking behavior. Students responded to the following question, “How many times do you ask for help

from the following sources for science last night?" Response choices included the following sources: *peer, teacher, family member, Internet, textbook, and personal notebook*. The students completed the homework checklist at the beginning of the class period to assess the number of times they accessed science help during the previous night. Student responses consisted of a number that could range from 0 to infinity.

Help-Seeking Student-Teacher Observation Sheet

The student teacher made group-level observations of student help-seeking behavior during class to assess the students' help-seeking behavior. This observation sheet is located in Appendix C. This observation sheet contained items assessing student help-seeking behavior that occurs when the homogeneous and heterogeneously grouped students were collaborating during inquiry-based education. The student teacher identified the number of times that students asked someone for assistance, asked for help to learn to solve problems independently, asked for help from another student, and asking for help to quickly obtain answers without understanding, asked for help from a teacher once a week. Help sought to learn to solve problems and find answer by themselves consisted of looking at both the board, in the textbook, or using the students' notebook to obtain help or answers.

In general, the instrumental students made more total help-seeking bids for help from peers than the expedient students did, and this result is consistent with information suggested by previous research (Karabenick, 2003).

The number of times that group-level observations occurred during the 5-week intervention unit for the randomly selected available pool for homogeneous instrumental, homogeneous expedient, heterogeneous instrumental, and heterogeneous expedient are

contained in Table 23. Instrumental help-seekers tended to ask someone for more assistance, whether that source of help be from formal or informal sources. Observations noted that students in the homogeneous expedient grouping sought the least amount of help from either formal or informal sources.

Table 23
Number of Times Observation Occurred during Group-Level-Classroom Observations Broken Down by Group Membership

Group	Asking someone for assistance (General)	Help sought to learn to solve problems by himself or herself (Instrumental)	Sought help in this class from another student (Peer)	Sought help to quickly get the answers needed (Expedient)	Sought help in this class from the teacher (Formal)
Instrumental Homogeneous	24	12	12	0	3
Expedient Homogeneous	7	1	1	7	6
Heterogeneous Group I	22	11	18	5	4
Heterogeneous Group II	19	15	11	7	3

Unlike previous results suggested by Karabenick with older students, in general, the expedient group of students reported more total help-seeking bids from the teacher than instrumental students did; furthermore, unlike previous results suggested, in general, expedient students reported more help-seeking bids from family members than the instrumental students did. Furthermore, the Internet was reported accessed more by the expedient students than by the instrumental students. Similar to other expedient help seekers who would use an informal source of help (Karabenick), in general, the expedient students reported more help-seeking bids using the textbook than the instrumental students did. Last, the personal notebook rarely was reported used by either instrumental or expedient students.

Table 24 contains the total number of self-reported help-seeking bids and means and standard deviations for homework and classwork for the randomly selected available pool for homogeneous instrumental, homogeneous expedient, heterogeneous instrumental, and heterogeneous expedient groupings broken down by peer and teacher.

Table 24
Total Number of Self-Reported Help-Seeking Bids, Means, and Standard Deviations for Homework and Classwork (Peer and Teacher) Broken Down by Group Membership

	Peer			Teacher		
	f	*M*	*SD*	*f*	*M*	*SD*
Homogeneous Instrumental						
HW	15	3.8	3.5	1	0.3	0.5
CW	111	27.8	7.8	4	1.0	0.8
Homogeneous Expedient						
HW	10	2.5	3.0	8	2.0	2.8
CW	35	8.8	7.1	10	2.5	3.7
Heterogeneous Instrumental						
HW	18	4.5	5.7	2	0.5	0.6
CW	145	36.3	34.5	36	9.0	7.7
Heterogeneous Expedient						
HW	32	8.0	4.2	3	0.8	1.5
CW	124	31.0	8.0	24	6.0	5.5

Table 25
Total Number of Self-Reported Help-Seeking Bids, Means, and Standard Deviations for Homework and Classwork (Family, Internet, Textbook, and Personal Notebook) Broken Down by Group Membership

	Family			Internet			Textbook			Notebook		
	f	*M*	*SD*	*f*	*M*	*SD*	*f*	*M*	*SD*	*f*	*M*	*SD*
Homogeneous Instrumental												
HW	0	0.0	0.0	2	0.5	1.0	7	1.8	2.4	0	0.0	0.0
CW	0	0.0	0.0	0	0.0	0.0	26	6.5	4.9	0	0.0	0.0
Homogeneous Expedient												
HW	4	1.0	1.4	8	2.0	3.4	9	2.3	3.3	1	0.3	0.5
CW	0	0.0	0.0	0	0.0	0.0	21	5.3	7.1	0	0.0	0.0
Heterogeneous Instrumental												
HW	2	0.5	1.0	4	1.0	0.8	3	.8	1.0	0	0.0	0.0
CW	0	0.0	0.0	0	0.0	0.0	14	3.5	5.2	0	0.0	0.0
Heterogeneous Expedient												
HW	2	0.5	1.0	6	1.5	1.3	5	1.3	1.3	0.0	0.0	0.0
CW	0	0.0	0.0	0	0.0	0.0	23	5.8	4.2	0.0	0.0	0.0

Table 25 contains the total number of self-reported help-seeking bids and means and standard deviations for homework and classwork for the randomly selected available pool for homogeneous instrumental, homogeneous expedient, heterogeneous instrumental, and heterogeneous expedient groupings broken down by family member, Internet, textbook, and personal notebook.

The next section contains information about the pilot study.

Pilot Study

The researcher conducted a pilot test on the help-seeking scales using a convenience sample consisting of 25 eighth-grade students in the Fall of 2009 school year. One intact science class was given the help-seeking instrument during a science class period at the same school site that this study was conducted at. A pilot test was necessary because the help-seeking instrument had not been used with middle-school students. Pilot-test participants were not part of the intervention. Permission slips were distributed to students in their science class. Twenty-four out of 25 permission slips were returned to the researcher on the day of data collection. Because of missing data, there were only 19 completed surveys. Student identity remained confidential, and students were identified by identification number only.

There were 19 items that stemmed from seven help-seeking scales in the survey. The seven scales consisted of general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, formal source, and informal source. Students rated items on a 7-point Likert-like scale ranging from 1 (*not at all true of me*) to 7 (*very true of me*). The reading grade level of the 19 items was 5.7. Students did not appear to have difficulties answering items.

An inspection of the operational definition as well as an initial inspection of the help-seeking scales suggested face and content validity as the items pertain to help seeking and the related theoretical rationales associated with help seeking. The five subscales represented achievement-goal orientation in the form of instrumental and expedient help seeking, general help-seeking intentions, help-seeking threat, help-seeking avoidance, and source of help. Due to a small sample size in the pilot study, reliabilities were calculated during this research project.

Restatement of the Research Questions

This section contains the research question that was addressed in this study.

1. What is the extent of the difference in the change in help-seeking attitudes, perceptions, and behaviors as measured by the help-seeking scales (general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help) from pretest to posttest after students received a treatment designed to help students develop appropriate help-seeking practices?
2. What changes occurred to the help-seeking attitudes, perceptions, and behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) of four homogeneous randomly selected identified instrumental help seekers from the available pool together during a class period for a 5- week mastery-oriented inquiry-based instructional unit?
3. What changes occurred to the help-seeking attitudes, perceptions, and behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) of four homogeneous randomly selected

identified expedient help seekers from the available pool together during a class periods for a 5-week mastery-oriented inquiry-based instructional unit?

4. What changes occurred to the help-seeking attitudes, perceptions, and behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) of four heterogeneous randomly selected identified instrumental and expedient help seekers after placing two identified instrumental help seekers with two identified expedient help seekers for a 5-week mastery-oriented inquiry-based instructional unit?
5. What differences in help-seeking attitudes, perceptions, and behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) arose when comparing across the homogeneous instrumental group, the heterogeneous expedient group, and the two heterogeneous groupings that contained two instrumental and two expedient help seekers?

Preliminary Analyses

In order to combine the four classes and to treat the students as one unit, a one-way analysis of variance (ANOVA) was carried out on science unit test, final science grade, homework study time, pretest general help-seeking summary score, pretest instrumental help-seeking summary score, pretest expedient help-seeking summary score, pretest help-seeking threat summary score, pretest help-seeking avoidance summary score, and pretest source of help (formal and informal) summary scores, and chi-square tests on gender, ethnicity, and free or reduced lunch, which was used as an indicator of socioeconomic status. The first assumption that must be satisfied to complete the ANOVA stated that the dependent variable was normally distributed for each of the

populations. The Central Limit Theorem (Weinberg & Abramowitz, 2006, p. 241) cannot be applied to meet the first assumption because not all of the four class periods had 30 participating students. Therefore, the sample is not large enough, and if the assumption of normality is violated, a Type I error may result.

The second assumption that needed to be satisfied to use ANOVA appropriately asserts that population variances of the dependent variable are the same for all populations. Levene's test for equal variances was not statistically significant indicating that there was very little difference in the results of science unit test, final science grade, homework study time, pretest general help-seeking summary score, pretest instrumental help-seeking summary score, pretest expedient help-seeking summary score, pretest help-seeking threat summary score, pretest help-seeking avoidance summary score, and pretest source of help (formal and informal) summary scores the four classes.

The third assumption is that the cases represent random samples from the population and the observations and data collection are independent of each other. Although students were randomly assigned to the classes, the students did not represent a random sample of eighth-grade middle-school students. A convenience sample was used, so this assumption is violated as the sample does not consist of a random sample of eighth-grade students. Last, the unit-test score science final grade, homework study time, free or reduced lunch, the pretest general help-seeking summary score, the pretest instrumental help-seeking score, the pretest help-seeking threat score, the pretest help-seeking avoidance score, the pretest informal help-seeking score, and the pretest formal help-seeking scores are not independent of each other, but observations are dependent as the observations are from the same group of students.

Although questions were raised about the three assumptions being satisfied, a one-way ANOVA was completed to investigate whether differences existed between the four classes on either science unit test, final science grade, homework study time, pretest general help-seeking summary score, pretest instrumental help-seeking summary score, pretest expedient help-seeking summary score, pretest help-seeking threat summary score, pretest help-seeking avoidance summary score, and pretest source of help (formal and informal) summary scores. The overall error rate was controlled at the .05 level. An inspection of the ANOVA results suggested that there were no statistically significant differences between the four different science classes when controlling the overall error rate for science unit test, final science grade, homework study time, pretest general help-seeking summary score, pretest instrumental help-seeking summary score, pretest expedient help-seeking summary score, pretest help-seeking threat summary score, pretest help-seeking avoidance summary score, pretest formal help-seeking summary score, and pretest informal help-seeking summary score.

To investigate if there were differences between the four classes for free or reduced lunch, gender, ethnicity, and ELL, a $\chi 2$ was computed on the two categories of free or reduced lunch, gender, and seven categories of ethnicity. There were two assumptions that must be met to use the $\chi 2$ appropriately (Weinberg & Abramowitz, 2006, p. 539). The first assumption stated that the observations must be from a random sample and that observations must be independent of each other. The second assumption stated that the $\chi 2$ analysis approximates a relatively large sample size. The first assumption is violated as observations did not come from a random sample, but observations are mutually exclusive and exhaustive of each other. The second

assumption is met when the cell size of the expected cell frequencies are greater than or equal to 5 (p. 539). For large tables, the second assumption is satisfied when no more than 20% of the cells have expected frequencies less than 5 (p. 539). The second assumption is questioned because not all cells satisfy the assumption. The variables gender and free or reduced lunch have expected cell frequencies larger than 5; however, the second assumption is violated for ELL as there are too few ELL to make a difference, as more than 20% of the cells have expected frequencies less than 5, questioning the validity of the results. In order to complete the $\chi 2$ analysis for ethnicity, the seven defined ethnicity categories of African American, Asian American, Filipino, Latino, Pacific Islander, European American, and other were combined to increase cell size. To satisfy the assumption for ethnicity, the researcher combined Asian, Pacific Islander, and Filipino into one Combined Asian ethnicity category and proceeded with the $\chi 2$ analysis for African American, Combined Asian, Latino, European American, and other. There were no statistically significant $\chi 2$ results for free or reduced lunch, ethnicity, or gender for the four classes.

Therefore, it does not appear that differences existed between the four science classes as assessed by unit test, final science grade, free or reduced lunch, ethnicity, gender, ELL, homework study time, pretest general help-seeking summary score, pretest instrumental help seeking summary score, pretest expedient help-seeking summary score, pretest help-seeking threat summary score, pretest help-seeking avoidance summary score, pretest formal help-seeking summary score, and pretest informal help-seeking summary score. All subsequent analyses combined the four classes.

Data Analysis Methods

The analysis used mastery-oriented inquiry-based education, the help-seeking instructions, and the student groupings as the treatments. The analysis used the help-seeking scales and cognitive assessments including science grade and science unit test score, general help seeking, instrumental help seeking, expedient help seeking, help-seeking avoidance, help-seeking threat scales, and source of help (Karabenick, 2003; Wolters et al., 2003) as dependent variables. No differences between the dependent variables were expected as students were not tracked in this middle-school science program. Although there were seven ELL students, there were no students receiving special education services.

Because four-intact classes were used, an analysis of variance of the unit test, final grade, general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help scores was undertaken to check for academic preexisting differences between the four classes when controlling the overall error rate at .05. Furthermore because no statistically significant academic differences or statistically significant differences in the help-seeking scales were found between the four classes in either pretest or posttest results when controlling the overall error rate, all cases were combined for remaining analyses.

Because no statistically significant academic differences were found, a dependent-samples *t* test was used to investigate what changes occurred for general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help (Karabenick, 2009; Wolters et al., 2003) from pretest to posttest. The overall error rate was controlled at the .05 level. No statistically significant

differences between the classes on the dependent variables were found as students were not tracked in this middle-school science program. Although there were ELL students in the classes, there were no students receiving special education services.

Because pretest differences were not found, a dependent-samples *t* tests was used to address the first research question. The independent variable was the mastery-based education program and help-seeking directions that students received. The research questions used general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, source of help (Karabenick, 2003; Wolters et al., 2003), self-reported homework help seeking, and self-reported classwork help seeking as dependent variables. Additionally, homework study time, final grade, unit test score, gender, free or reduced lunch, English Language Learner (ELL), class period were additional variables used in this study.

For each part of the research question, changes in help-seeking scores from pretest to posttest were analyzed. The overall error rate was controlled at the .05 level for the first research question. Effect sizes were computed for statistically significant *t*-test results.

An analysis consisting of the correlations within the help-seeking scales was completed. The help-seeking scales consisted of general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help. Anticipated correlational results were similar but not identical to those obtained by Wolters et al. (2003) for the help-seeking scales. The help-seeking correlation results suggested instrumental help seekers were different statistically from expedient help seekers displaying lower levels of help-seeking threat and help-seeking avoidance.

Conversely, expedient help seekers were different statistically from instrumental help seekers displaying higher levels of help-seeking threat and help-seeking avoidance.

Means and standard deviations were computed for the number of observations (general help seeking, instrumental help seeking, expedient help seeking, and source of help) the both student teacher observations as well as the classwork-(peer, teacher, Internet, textbook, and personal notebook) and homework-(peer, teacher, family member, Internet, textbook, and personal notebook) checklist sheets. Comparisons were made across the homogeneous instrumental, homogeneous expedient, and heterogeneous groupings for general help seeking, instrumental help seeking, expedient help seeking, and source of help.

The t-test Assumptions

This next section contains the results for the research question and the assumptions that must be satisfied to complete the analyses.

There were three underlying dependent-sample *t*-test assumptions. The first assumption that must be satisfied was that the dependent variable must be normally distributed in the population, however, because the sample size consisted of 123 students, the Central Limit Therom can be applied to satisfy this assumption as the analysis combined all four classes. The second assumption that must be satisfied in order to complete the one-sample *t*-test was that the cases must represent a random sample from the population. This assumption was violated as students were not randomly selected to participate, participants only were assigned randomly to classes. The third assumption that must be satisfied was that the scores on the test variables must be independent of

each other, and this assumption was met as students' scores are individual and each item is only used once in each of the subscales.

Researcher and Teacher Qualifications

The researcher and teacher who taught the unit during this study received both her Bachelor's of Science in Biological Sciences and Teaching Credential from a large public university in Northern California and her Masters in Arts in Educational Administration from a large private university in the San Francisco Bay area. The researcher has a teaching credential allowing her to teach K-12 Biological Sciences and Chemistry. The researcher also has satisfied requirements completing the Cross Cultural, Language, and Academic Development program. The researcher taught seventh-grade middle-school science for 8 years and has taught eighth-grade middle-school science for 4 years. The researcher was science department chair for 4 years and has participated in several district-wide committees including Standard's-Based Report Card Committee, Textbook Adoption Committees, and Human Growth and Development Committee. The researcher has been a beginning teacher support provider for 4 years and has opened her classroom up to several student teachers.

Summary

This chapter contained the research design employed in this study, location and sample of the participants in this study, and the protection of human subjects procedures. This chapter also presented descriptions about the five instruments that were used to collect data from the students. Instruments included the help-seeking scales (general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help), the demographic information sheets, the student

science classwork-checklist sheet, the homework-checklist sheet, and the teacher observation sheet. Last, this chapter presented information concerning the treatment, proposed data analyses, and information about the pilot test.

The next chapter contains the results obtained from the data collection of this research project the results to the dependent samples *t* test, and the posttest correlation coefficients for the help-seeking scales, and the results to the five research questions.

CHAPTER IV

RESULTS

The purpose of this study was to investigate how mastery-oriented inquiry-based education influenced the help-seeking attitudes, perceptions, and behaviors of middle-school students. Student attitudes and perceptions of help seeking were assessed before and after middle-school students participated in an inquiry-based education program using physics activities with mastery-oriented directions and focus questions for the duration of a 5-week unit. The help-seeking attitudes and perceptions were assessed by the help-seeking scales developed by Karabenick (2003) and Wolters, Pintrich, and Karabenick (2003). The help-seeking scales included general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help. Achievement data including science grade and unit test score were collected to assess the effectiveness of the inquiry-based educational program. Demographic data were collected in order to conduct additional analyses. Students completed a student classwork checklist and a student homework checklist in addition to completing regular in-class and out-of-class assignments in class to assess help-seeking behavior tendencies.

All students participated in a treatment consisting of examples of appropriate help seeking. Students received regular reminders about appropriate help-seeking practices. In order to assess help-seeking behaviors, students completed a student classwork checklist and a student homework checklist in addition to completing regular in-class and out-of-class assignments. The students self-reported their help-seeking tendencies using the classwork- and homework-checklist sheets.

After obtaining the initial help-seeking scores from the pretest for the instrumental and expedient subscales, all 123 students were identified as high instrumental help seekers, high expedient help seekers, or neither. The pool of high instrumental help seekers and high expedient help seekers produced 16 students who were randomly selected to participate in the student groupings (a homogeneous-instrumental group, homogeneous- expedient group, and two heterogeneous groups).

In order to designate students as high instrumental, high expedient, or neither, an instrumental help-seeking summary score and expedient help-seeking summary score were created by summing the scores from the three items from the respective scales. Students with scores greater than 14 were considered high on that particular subscale. From this available pool of students, a total of only 16 students were selected randomly and placed into a group of either four homogeneous instrumental help seekers, four homogeneous expedient help seekers, or a heterogeneous group consisting of both two instrumental and two expedient help seekers. Four students were selected from the available pool for the homogeneous instrumental help-seeking group, and four students were selected from the available pool for the homogeneous expedient help-seeking group. Four instrumental and four expedient students were selected from the available pool for the heterogeneous help-seeking group; from these four instrumental and expedient students, two of the four selected instrumental students were paired with two of the four selected expedient students forming two heterogeneous groups consisting of four students each. The remaining two instrumental students were paired with the other two remaining expedient students to form the other heterogeneous grouping.

Qualitative group-level data were obtained by the student teacher weekly during instructional activities using the observation sheet to examine group-level help-seeking behavior (general help seeking, instrumental help seeking, expedient help seeking, formal help seeking, and informal help seeking) of the students who were selected and were placed into the groupings. Group-level observations were made by the student teacher. Group-level observations were made on the four groups (instrumental students, expedient students, two heterogeneous) by the student teacher weekly.

This chapter contains the results to the five research questions plus additional analyses including posttest correlation coefficients among the help-seeking variables.

Results for the Research Questions

This section contains the answers for the five research questions. The answer to the first research question is broken down by descriptive results and dependent-samples *t*-test results. The answers to the second, third, fourth, and fifth research questions include descriptive results about the help-seeking behaviors from both the group-level observations and the self-reported data from the classwork- and homework-checklist sheets.

First Research Question

The first research question investigated the extent of the difference in the change in help-seeking attitudes, perceptions, and behaviors as measured by the help-seeking scales (general help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, help-seeking avoidance, and source of help) from pretest to posttest after students received a treatment of inquiry-based education as well as providing students with ways to help students develop appropriate help-seeking practices.

All scores for each individual student were summed to create a summary score for each of the seven subscales. General help seeking, instrumental help seeking, expedient help seeking, help-seeking threat, and help-seeking avoidance had a sum that ranged from 3 to 21 because there were three items that constituted the respective subscales, whereas the formal and informal help-seeking subscales had a sum that ranged from 2 to 14 because there were only two items included in the summary score for the formal and informal scales.

Table 26 contains the descriptive help-seeking scales results obtained before and after eighth-grade students participated in inquiry-based and mastery-oriented educational practices.

Table 26
Means, Standard Deviations, *t*-test Results, and Effect Sizes when Comparing Pretest and Posttest Summary Score for Seven Help-Seeking Scales Before and After 123 Middle-School Students Participated in Inquiry-Based Education

		Pretest		Posttest			
Scale	n	*M*	*SD*	*M*	*SD*	*t*	Effect Size[a]
General HS	121	14.73	3.50	15.26	3.91	- 1.55	
Instrumental HS	120	15.83	3.06	16.04	3.44	- 0.61	
Expedient HS	120	9.94	3.93	8.29	4.12	5.06*	.46
HS Threat	118	10.81	3.66	9.47	3.28	3.58*	.33
HS Avoidance	120	8.29	4.42	7.38	3.62	2.41*	.22
Informal HS	118	10.06	3.10	10.75	2.52	-2.47*	-.23
Formal HS	118	8.81	3.03	8.48	3.15	1.09	

*Statistically significant at the .05 level.
[a] Effect size computed for statistically significant result only.

On the pretest, students, on average, had the highest scores for instrumental help-seeking summary and general help-seeking summary scores. On the pretest, the lowest scores for the students belonged to help-seeking avoidance summary and help-seeking threat summary scores. On the pretest, students, on average, showed a preference for informal help-seeking summary over formal help-seeking summary.

On the posttest, students, on average, had the highest scores for instrumental help-seeking summary score and general help-seeking summary score. On the posttest, the lowest scores for the students belonged to help-seeking avoidance summary and help-seeking threat summary. Students on the posttest, on average, showed a preference for informal help-seeking summary over formal help-seeking summary.

A series of dependent-samples *t* tests were conducted to examine the mean differences in pretest and posttest scores on each of the seven help-seeking scales to answer the first research question. The researcher anticipated an increase in general help seeking, an increase in instrumental help seeking, a decrease in expedient help seeking, a decrease in help-seeking threat, a decrease in help-seeking avoidance, an increase in formal help seeking, and an increase in informal help seeking. Specifically, *t*-test analyses revealed a statistically significant decrease in scores on help-seeking threat at posttest in comparison with pretest scores, $t(1, 117) = 3.58$ producing a moderate effect size. The help-seeking avoid scale also had statistically significant lower scores at posttest in comparison with pretest scores $t(1, 119) = 2.41$ producing a small effect size. In addition, the researcher found that informal help-seeking scores statistically and significantly increased at posttest in comparison with pretest scores $t(1, 118) = 2.47$ producing a small effect size. Finally, there were statistically significant lower scores on expedient help-seeking at posttest in comparison with pretest scores, $t(1, 119) = 5.06$ producing a moderate effect size. There were no statistically significant differences found when comparing pre- and posttest scores on general help-seeking, instrumental help seeking, and formal help seeking, although increases in general help seeking and

instrumental help seeking were observed. Dependent-sample *t*-test results are contained in Table 25.

Descriptive Results to Second, Third, Fourth, and Fifth Research Questions

On average, the heterogeneous expedient group of students self-reported the largest amount of study time with the largest variation, whereas the homogeneous expedient group of students self-reported the smallest amount of study time with the smallest variation. On average, the homogeneous instrumental group had the both the highest unit test score and final grade, whereas the homogeneous expedient group had the lowest unit test grade and final grade scores. The heterogeneous expedient group had the smallest amount of variation for both the unit test and final grade, whereas the heterogeneous instrumental group had the largest variation for the unit test and the homogeneous instrumental group had the largest variation for final grade.

On average, the heterogeneous expedient group had the lowest instrumental scores with the greatest amount of variation, whereas the homogeneous instrumental group had the highest instrumental scores at pretest. On average, the heterogeneous instrumental group had the lowest expedient scores, whereas the homogeneous expedient group had the largest expedient sores at pretest. The homogeneous instrumental group showed the largest amount of variation, whereas the heterogeneous expedient group showed the smallest amount of variation at pretest. On average, the heterogeneous instrumental group had the highest instrumental posttest scores and the smallest variation, whereas the homogeneous expedient group had the smallest instrumental scores at posttest with the largest amount of variation. On average, the heterogeneous instrumental group had the lowest expedient scores with the smallest variation at posttest, whereas the

homogeneous expedient group had the largest expedient scores at posttest. On average, expedient students had the largest gains in instrumental help seeking summary score and all students were observed to decrease in expedient help seeking tendencies.

In addition to gathering the quantitative data from the help-seeking scales (general, instrumental, expedient, formal, and informal), group-level observations were made of the 16 students (instrumental homogeneous, expedient homogeneous, and two heterogeneous) by the student teacher weekly. The total number of times that group-level observations occurred during the 5-week intervention unit for the randomly selected available pool for homogeneous instrumental, homogeneous expedient, heterogeneous instrumental, and heterogeneous expedient are contained in Table 27 and are broken down by group membership.

Table 27
Total Number of Times Observation Occurred during Group-Level-Classroom Observations Broken Down by Group Membership

Group	Asking someone for assistance (General)	Help sought to learn to solve problems by himself or herself (Instrumental)	Sought help in this class from another student (Peer)	Sought help to quickly get the answers needed (Expedient)	Sought help in this class from the teacher (Formal)
Instrumental Homogeneous	24	12	12	0	3
Expedient Homogeneous	7	1	1	7	6
Heterogeneous Group I	22	11	18	5	4
Heterogeneous Group II	19	15	11	7	3

The group-level observations suggest that the instrumental homogeneous students sought the most general help. The two heterogeneous groups also had more observations of students seeking general assistance, whereas the expedient group was not observed to

seek general help often. The most instrumental help was sought by both the heterogeneous groups and the instrumental group, whereas the expedient group was observed to seek the least amount of instrumental help. The most expedient help was sought by the expedient group and the heterogeneous groups. The most informal help was sought by the heterogeneous groups and the instrumental groups. The most formal help was sought by the expedient group.

The group-level observations noted that students in the homogeneous expedient group sought the least amount of help from either formal or informal sources. Group-level observations suggest that when expedient help seekers are paired with instrumental help seekers, expedient help seekers benefit from the partnership by being able to participate in group-level discussions. When the heterogeneous pairings occurred, observations noted that expedient students tended to report more help seeking from both formal and informal sources of help and be observed to seek help more instrumental help frequently. It was unfortunate that group-level observations were not completed daily for the 5-week intervention period. Furthermore, the group-level observations were not broken down to the individual level making direct comparisons to the student-self-reports impossible.

Help-seeking behavior included student self-reports of the number of times that help was sought from peers, teacher, family, Internet, textbook, and notebook. Table 28 contains the total number of self-reported help-seeking bids and means and standard deviations for homework and classwork for the randomly selected available pool for homogeneous instrumental, homogeneous expedient, heterogeneous instrumental, and heterogeneous expedient groupings broken down by peer and teacher.

Table 28
Total Number of Self-Reported Help-Seeking Bids, Means, and Standard Deviations for Homework and Classwork (Peer and Teacher) Broken Down by Group Membership

	Peer			Teacher		
	f	*M*	*SD*	*f*	*M*	*SD*
Homogeneous Instrumental						
HW	15	3.8	3.5	1	0.3	0.5
CW	111	27.8	7.8	4	1.0	0.8
Homogeneous Expedient						
HW	10	2.5	3.0	8	2.0	2.8
CW	35	8.8	7.1	10	2.5	3.7
Heterogeneous Instrumental						
HW	18	4.5	5.7	2	0.5	0.6
CW	145	36.3	34.5	36	9.0	7.7
Heterogeneous Expedient						
HW	32	8.0	4.2	3	0.8	1.5
CW	124	31.0	8.0	24	6.0	5.5

Table 29
Total Number of Self-Reported Help-Seeking Bids, Means, and Standard Deviations for Homework and Classwork (Family, Internet, Textbook, and Personal Notebook) Broken Down by Group Membership

	Family			Internet			Textbook			Notebook		
	f	*M*	*SD*	*f*	*M*	*SD*	*f*	*M*	*SD*	*f*	*M*	*SD*
Homogeneous Instrumental												
HW	0	0.0	0.0	2	0.5	1.0	7	1.8	2.4	0	0.0	0.0
CW	0	0.0	0.0	0	0.0	0.0	26	6.5	4.9	0	0.0	0.0
Homogeneous Expedient												
HW	4	1.0	1.4	8	2.0	3.4	9	2.3	3.3	1	0.3	0.5
CW	0	0.0	0.0	0	0.0	0.0	21	5.3	7.1	0	0.0	0.0
Heterogeneous Instrumental												
HW	2	0.5	1.0	4	1.0	0.8	3	.8	1.0	0	0.0	0.0
CW	0	0.0	0.0	0	0.0	0.0	14	3.5	5.2	0	0.0	0.0
Heterogeneous Expedient												
HW	2	0.5	1.0	6	1.5	1.3	5	1.3	1.3	0	0.0	0.0
CW	0.0	0.0	0.0	0	0.0	0.0	23	5.8	4.2	0	0.0	0.0

Table 29 contains total number of self-reported help-seeking bids and means and standard deviations for homework and classwork for the randomly selected available pool for homogeneous instrumental, homogeneous expedient, heterogeneous instrumental, and heterogeneous expedient groupings broken down by family member, Internet, textbook, and personal notebook broken down by group membership.

Information from the classwork- and homework-checklist sheets that was self-reported by students suggest that instrumental help-seekers tended to ask someone for more assistance, whether that source of help be from formal or informal sources. In general, the instrumental students made more total help-seeking bids for help from peers than the expedient students did. In general, the expedient group of students reported more total help-seeking bids from the teacher than instrumental students did; furthermore, in general, expedient students reported more help-seeking bids from family members than the instrumental students did. Additionally, the Internet was reported accessed more by the expedient students than by the instrumental students. The expedient students reported more help-seeking bids using the textbook than the instrumental students did. Last, the personal notebook rarely was reported used by either instrumental or expedient students. Because the data were self-reported and not directly observed from the students during the 5-week intervention period, the exact behaviors of students is not known.

Second Research Question

The second research question was what changes occurred to the help-seeking attitudes, perceptions, and behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) of four homogeneous randomly selected identified instrumental help seekers from the available pool together during a class period for a 5-week mastery-oriented inquiry-based instructional unit? The student teacher's group-level observations included what help-seeking behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) occurred during student groupings of four homogeneous randomly selected identified instrumental help seekers from the available pool together weekly during the 5-week mastery-oriented

inquiry-based instructional unit. Individual help-seeking behaviors of the instrumental students were examined also through the student self-reports obtained from the classwork- and homework-checklist sheets.

In order to examine the changes in help-seeking attitudes and perceptions, changes were noted from the help-seeking scales (general help seeking, instrumental help seeking, expedient help seeking, and source of help) from pretest to posttest. In order to examine the group-level help-seeking behavior of the students in this study, the student teacher made student group-level observations during class once a week for the duration of the 5-week instructional unit of the randomly selected available pool of homogeneous and heterogeneous students to log the help-seeking behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) of four homogeneous randomly selected identified instrumental help seekers from the available pool together during a 5-week mastery-oriented inquiry-based instructional unit. These observations consisted of weekly group-level observations that were broken down to the student level. Individual help-seeking behaviors of the students placed into the student groups were examined by the student-self-reports of classwork and homework help-seeking behaviors.

For the instrumental group, a decrease occurred in general help seeking, instrumental help seeking, expedient help seeking, and informal help seeking from pretest to posttest as measured by the help-seeking scales. Although the declines in general, instrumental, and informal help seeking were not large, these declines were not anticipated as the achievement-goal structures of these students should have been supported by the instructional activities presented in the class; however, the decrease in

expedient help seeking was anticipated and was observed.

The homogeneous instrumental group reported using the textbook more often for support and help. The homogeneous instrumental group reported asking peers for help more often than from the teacher.

The group-level observations suggest that the instrumental homogeneous students sought the most general help and asked for help that would help them solve problems independently.

Third Research Question

The third research question was what changes occurred to the help-seeking attitudes, perceptions, and behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) of four homogeneous randomly selected identified expedient help seekers from the available pool together during a class periods for a 5-week mastery-oriented inquiry-based instructional unit? The student teacher's group-level observations included what help-seeking behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) occurred during student groupings of four homogeneous randomly selected identified expedient help seekers from the available pool together weekly during the 5-week mastery-oriented inquiry-based instructional unit. Help-seeking behaviors of the expedient students were examined also through the student self-reports obtained from the classwork- and homework-checklist sheets.

An increase occurred in general help seeking, formal help seeking, and informal help seeking from pretest to posttest as measured by the help-seeking scales for the expedient students. Additionally, decreases occurred in instrumental and expedient help

seeking. The self-reported increases in general help seeking, formal, and informal help seeking from pretest to posttest was anticipated; however, the decrease in instrumental help seeking was not.

The student self-reports from the homework- and classwork-checklist sheets suggest that the expedient group asked for assistance more from the teacher than from peers.

Group-level observations noted that there was limited group-level interaction between identified expedient students. Furthermore, the group-level observations stated that the expedient help seekers tended to ask for expedient help more often from the teacher than the students in the other groups did. The group-level observations noted that students in the homogeneous expedient grouping sought the least amount of help from either formal or informal sources. It is unfortunate that observations were not completed on the student or individual level but instead occurred at the group level.

Fourth Research Question

The fourth research question was what changes occurred to the help-seeking attitudes, perceptions, and behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) of four heterogeneous randomly selected identified instrumental and expedient help seekers after placing two identified instrumental help seekers with two identified expedient help seekers for a 5-week mastery-oriented inquiry-based instructional unit? The student teacher's group-level observations included what help-seeking behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) occurred during student groupings of four heterogeneous randomly selected identified instrumental and expedient

help seekers after placing two identified instrumental help seekers with two identified expedient help seekers for a 5-week mastery-oriented inquiry-based instructional unit. Help-seeking behaviors of the heterogeneously grouped students were examined also through the student self-reports obtained from the classwork- and homework-checklist sheets.

The instrumental heterogeneous students had decreases on the help-seeking scales from pretest to posttest in general help seeking, expedient help seeking, formal help seeking, and informal help seeking. The instrumental heterogeneous students had an increase in instrumental help seeking from pretest to posttest.

The heterogeneous instrumental students had the most self-reported requests for informal peer help and the most self-reported requests for formal teacher help.

The heterogeneous expedient students self-reported increases in general help seeking, instrumental help seeking, formal help seeking, and informal help seeking on the help-seeking scales from pretest to posttest. There was a decrease in expedient help seeking from pretest to posttest for the heterogeneous expedient students.

Both heterogeneous groups engaged in conversation when help was necessary as indicated by group-level observations. Group-level observations noted that sometimes the identified expedient help seekers joined in to conversations; however, group-level observations noted expedient help seekers seeking help quickly to obtain answers from both teacher and peers by copying answers from peers more often than the instrumental students did.

Fifth Research Question

The last research question was what differences in help-seeking attitudes,

perceptions, and behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) arose when comparing across the homogeneous instrumental group, the heterogeneous expedient group, and the two heterogeneous groupings that contain two instrumental and two expedient help seekers? The student teacher's group-level observations included what help-seeking behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) occurred during student groupings when comparing across the homogeneous instrumental group, the heterogeneous expedient group, and the two- heterogeneous groupings that contain two-instrumental and two-expedient help seekers. Help-seeking behaviors of the homogeneously and heterogeneously grouped students were examined also through the student self-reports obtained from the classwork- and homework-checklist sheets.

General help seeking decreased for all instrumental students, on average, whereas general help seeking increased, on average, for the expedient students from pretest to posttest for the observed student groupings. An increase in instrumental help seeking was observed, on average, from pretest to posttest for all groupings except for the homogeneous instrumental group. An anticipated decrease occurred, on average, for all groups for expedient help seeking from pretest to posttest. On average, increases in formal help seeking occurred for the expedient groupings, whereas a decrease in formal help seeking occurred for the heterogeneous instrumental group, on average. Decreases in informal help seeking were observed for the instrumental students, whereas increases in informal help seeking occurred for the expedient students.

Instrumental students sought the most general help, whereas the expedient students sought the least amount of general help as suggested by the group-level

observations. The students in the heterogeneous groups sought nearly as much general help as the homogeneous instrumental students did. The students who sought the most help from peers were in the instrumental group and the two heterogeneous groups, whereas the expedient students rarely sought help from peers. The most expedient help seeking experiences were observed to be from the heterogeneous groups and the expedient group. Formal help was sought in all four groups.

The heterogeneous expedient students self-reported the most help seeking during homework from peers; the homogeneous expedient students self-reported the least amount of help seeking during homework from peers. The homogeneous expedient students self-reported seeking help from the teacher during homework more frequently than the other groups did. The homogeneous expedient students self-reported using family members as help-seeking sources more frequently that the other groups did. The textbook was self-reported used by the homogeneous expedient and instrumental students more frequently than the other students did. The Internet and personal notebook were rarely self-reported as used by any of the groups.

The heterogeneous students self-reported the most help seeking during class time from peers; the expedient students self-reported the least amount of help seeking from peers during class time. The instrumental students in the heterogeneous group self-reported the most help seeking from the teacher during class time; the instrumental students self-reported the least amount of help seeking from teacher during class time. The instrumental and heterogeneous expedient students self-reported using the textbook the most during class time, whereas the heterogeneous instrumental students self-reported using the textbook the least during class time.

The next section contains the Pearson Product-Moment correlation coefficients obtained from the posttest results from the seven help-seeking subscales.

Posttest Pearson Product-Moment Correlation Coefficients

An analysis involving pairwise Pearson product-moment correlation coefficients was completed on the posttest general help-seeking, instrumental help-seeking, expedient help-seeking, help-seeking threat, help-seeking avoidance, formal help-seeking, and informal help-seeking summary variables.

The results from the posttest Pearson Product-Moment correlation coefficient analysis for all 123 students produced a very moderately strong positive and statistically significant correlation between general help seeking and instrumental help seeking, help-seeking avoidance, and formal help seeking when controlling the overall error rate at the .05 level. A statistically significant moderate positive correlation between general help seeking and instrumental help seeking and formal help seeking occurred. A statistically significant small positive correlation occurred between informal help seeking, unit test and final grade.

A strong negative correlation between general help seeking and help-seeking avoidance was observed. Weak statistically significant positive correlations occurred between instrumental help seeking and formal help seeking, informal help seeking, unit test, and final grade when controlling the overall error rate. A moderately strong negative statistically significant correlation occurred between instrumental help seeking and help-seeking avoidance. Expedient help seeking had weak, yet statistically significant positive correlation between help seeking threat and avoidance. A moderate and statistically significant positive correlation occurred between help-seeking threat and help-seeking

avoidance. A statistically significant moderately negative correlation occurred between help-seeking avoidance and formal help seeking and final grade. A moderately positive correlation occurred between informal help seeking and unit test and final grade. A strong positive correlation was observed between unit test and final grade. Results are contained in Table 30.

Table 30
Pearson Product-Moment Correlation Coefficients Obtained from the Posttest Summary for Gender, Unit Test, General Help-Seeking, Instrumental Help-Seeking, Expedient Help-Seeking, Help-seeking Threat, Help-Seeking Avoidance, Formal Help-Seeking, and Informal Help-Seeking Subscales

Scale	Post Gen	Post Inst	Post Expe	Post Threa	Post Avoid	Post Form	Post Inf	Gen	UT
Post Instrum	.67*								
Post Exped	-.25	-.26							
Post Threat	-.11	.00	.31*						
Post Avoid	-.70*	-.52*	.37*	.36*					
Post Formal	.56*	.41*	-.19	-.17	-.41*				
Post Informal	.34*	.36*	.15	.10	-.28	.03			
Gender	.04	.04	-.16	.04	.01	.04	.04		
Unit Test	.27*	.32*	-.06	.04	-.21	.07	.30*	-.12	
Final Grade	.33*	.38*	-.13	.10	-.30*	.13	.33*	-.08	.81*

Statistically significant at the .05 level.

Summary

This chapter contained results for the dependent-samples *t* test showing differences from pretest to posttest for the seven help-seeking subscales, the observations made of students during the 5-week unit, and the correlations between the help-seeking scales. Statistically significant *t*-test differences resulted for expedient help seeking, help-seeking threat, help-seeking avoidance, and informal help seeking when controlling the overall

error rate. A statistically significant decrease occurred for expedient help seeking, help-seeking threat, help-seeking avoidance from pretest to posttest. A statistically significant increase occurred for informal help seeking from pretest to posttest.

For the homogeneous instrumental students, decreases occurred in general help seeking, instrumental help seeking, expedient help seeking, and informal help seeking from pretest to posttest. There was no change in formal help seeking from pretest to posttest. For the homogeneous expedient students, decreases occurred in instrumental help seeking and expedient help seeking. Increases occurred in general help seeking, formal help seeking, and informal help seeking for the homogeneous expedient students from pretest to posttest.

For the instrumental students in the heterogeneous groups, decreases occurred for general help seeking, expedient help seeking, formal help seeking, and informal help seeking from pretest to posttest. An increase occurred in instrumental help seeking for the instrumental students in the heterogeneous groups. For the expedient students in the heterogeneous groups, increases occurred in general help seeking, instrumental help seeking, formal help seeking, and informal help seeking from pretest to posttest. A decrease occurred for expedient help seeking for the expedient students in the heterogeneous groups.

When comparing across the four student groupings, on average, general help seeking decreased for the instrumental help seekers in both the homogeneous and heterogeneous groups from pretest to posttest, whereas the expedient students in both the homogeneous and heterogeneous groups increased from pretest to posttest. Both the instrumental and expedient homogeneously grouped students showed decreases in

instrumental help seeking, on average, whereas the instrumental and expedient heterogeneously grouped students showed increases in instrumental help seeking from pretest to posttest. All groups decreased, on average, in expedient help seeking from pretest to posttest. Both homogeneous and heterogeneous expedient students showed increases in formal help seeking from pretest to posttest, on average, whereas only the heterogeneous instrumental group showed decreases in formal help seeking. Both homogeneous and heterogeneously grouped instrumental students showed decreases in informal help seeking, on average, whereas both the homogeneous and heterogeneously grouped expedient students showed increases in informal help seeking from pretest to posttest.

Statistically significant positive Pearson product-moment correlation coefficients occurred between general help seeking and instrumental help seeking, formal help seeking, informal help seeking, unit test, and final grade on the posttest, whereas a statistically significant negative correlation occurred for help-seeking avoidance. Statistically significant positive correlations occurred between instrumental help seeking and formal help seeking, informal help seeking, unit test, and final grade, whereas a statistically significant negative correlation occurred for help seeking avoidance on the posttest. Statistically significant positive correlations occurred between expedient help seeking and help-seeking threat and help-seeking avoidance. A statistically significant positive correlation occurred between help-seeking threat and help-seeking avoidance. Statistically significant negative correlations occurred between formal help seeking and final grade. Statistically significant positive correlations occurred between informal help

seeking and unit test and final grade. A statistically significant positive correlation occurred between unit test and final grade.

Students made more help-seeking bids of peers than of any other source of help, especially in class. Identified instrumental help seekers made more help-seeking bids than their identified expedient help-seeking counterparts did.

The final chapter contains the limitations, summary of findings, conclusions drawn from the research question, drawn from the student groupings, drawn from the correlation coefficients for the help-seeking scales, and drawn from the help-seeking behavior classwork and homework checklists, and implications of the data for classroom and educational purposes, and recommendations for future research.

CHAPTER V

DISCUSSION, SUMMARY OF FINDINGS, LIMITATIONS, IMPLICATIONS FOR EDUCATIONAL PRACTICES, AND RECOMMENDATIONS FOR FUTURE RESEARCH

The purpose of this study was to investigate how mastery-oriented inquiry-based education influences the help-seeking attitudes, perceptions, and behaviors of middle-school students. Students completed the help-seeking scales (general help seeking, instrumental help seeking, expedient help seeking, help-seeking anxiety, help-seeking avoidance, and source of help) in a pretest-posttest design. Students also completed daily homework- and classwork-checklist sheets reporting on their help-seeking behavior. Observations were made on a total of 16 students assessing their help-seeking behaviors. All students participated in a treatment consisting of appropriate help seeking strategies.

Data were gathered over a 5-week period from eighth-grade students in a San Francisco Bay-area middle school in order to assess if participation in an inquiry-based education program combined with an education of appropriate and inappropriate help-seeking strategies had an impact on the help-seeking attitudes, perceptions, and behaviors. Five research questions guided analysis of the collected data. This final chapter presents a summary of the research and study limitations. Furthermore, this chapter contains a discussion of the results with regard previous research on academic help seeking and the links to achievement goals and help seeking. Last, implications for educational practice and recommendations for future research are presented.

Summary of Results

This section contains the summary of results from the five research questions, organized by a research question that is followed by the summary of results. Last, this

section contains additional analyses from examination of correlation coefficients and the classwork- and homework-checklist sheets.

First Research Question

Results for the research question how does mastery-oriented inquiry-based learning influence the help-seeking attitudes, perceptions, and behaviors of middle-school science students showed a statistically significant decrease in scores on the help-seeking threat at posttest in comparison with pretest scores, showed a statistically significant decrease in scores on the help-seeking avoidance scales at posttest in comparison with pretest scales, revealed a statistically significant increase in scores on the informal help-seeking scores, and found a statistically significant decrease in the expedient help-seeking scores at posttest in comparison with pretest.

Help-seeking behaviors of all participating students were investigated through self-reported classwork- and homework-checklist sheets. More total help-seeking bids were reported during class activities than during homework activities for all 123 students. The most self-reported help-seeking requests for classwork for all 123 students were made of peers and of the teacher, whereas the lowest self-reported help-seeking requests were made of the Internet and personal notebook. Students self-reported the most help-seeking requests during classwork. The most self-reported help-seeking requests were made of peers and of the teacher, whereas the lowest self-reported help-seeking requests were made of the Internet and personal notebook.

For homework, students self-reported more help-seeking bids from peers and family members than they self-reported from formal sources including teacher and textbook. The most self-reported help-seeking requests for all 123 students were made

during homework activities of peers and family members whereas the lowest self-reported help-seeking requests were made of the Internet and personal notebooks. More technology requests for help occurred outside of the classroom than inside the classroom. More technology requests for help occurred outside of the classroom because not all students had access to the computer lab during class time.

Second Research Question

Next four research questions examined the student groupings' help-seeking attitudes, perceptions, and behaviors. The four student groupings were composed of one group of homogeneous instrumental help-seeking students, another group of expedient help-seeking students, and the remaining two groups were heterogeneous composed of two instrumental and two expedient help-seeking students.

The second question focused on the changes in the help-seeking attitudes, perceptions, and behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) of the four homogeneous randomly selected identified instrumental help-seeking students from the available pool together during a class period for a 5-week mastery-oriented inquiry-based instructional unit. The general, instrumental, expedient, and informal help-seeking scores decreased from pretest to posttest for the homogeneous instrumental group. Formal help-seeking scores for the homogeneous expedient group remained the same from pretest to posttest.

Help-seeking behaviors were examined using the student self-reported classwork- and homework-checklist sheets. The homogeneous instrumental group self-reported using the textbook more often for support and help than the other groups did. The homogeneous instrumental group self-reported asking peers for help more often than

from the teacher.

Help-seeking behaviors were examined also using during weekly group-level observations. The group level observations suggest that the instrumental homogeneous students sought more general help and asked for more help that would help them solve problems independently than the other groups did.

Third Research Question

The third research question focused on the changes in the help-seeking attitudes, perceptions, and behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) of four homogeneous randomly selected identified expedient help seekers from the available pool together during a class periods for a 5-week mastery-oriented inquiry-based instructional unit. The general, formal, and informal help-seeking scores increased from pretest to posttest for homogeneous-expedient students. The instrumental and expedient help-seeking scores decreased from pretest to posttest for homogeneous-expedient students.

Help-seeking behaviors were examined using the student self-reported classwork- and homework-checklist sheets. The student self-reports from the homework and classwork-checklists suggest that the expedient group asked for assistance more from the teacher than from peers than the other groups did.

Help-seeking behaviors were examined also using during weekly group-level observations. Group-level observations noted that there was limited group-level interaction between expedient students. The group-level observations noted that the expedient help seekers tended to ask for expedient help more often from the teacher than the students in the other groups did. Furthermore, the group-level observations noted that

students in the homogeneous expedient grouping were observed to seek the least amount of help from either formal or informal sources.

Fourth Research Question

The fourth research question focused on the changes in the help-seeking attitudes, perceptions, and behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) of four heterogeneous randomly selected identified instrumental and expedient help seekers after placing two identified instrumental help seekers with two identified expedient help seekers for a 5-week mastery-oriented inquiry-based instructional unit. General, expedient, formal, and informal help-seeking scores decreased from pretest to posttest for the heterogeneous-instrumental students. Instrumental help-seeking scores increased from pretest to posttest for the heterogeneous-instrumental students. General, instrumental, formal, and informal help-seeking scores increased for heterogeneous-expedient students from pretest to posttest. Expedient help-seeking scores decreased for heterogeneous expedient help-seeking students from pretest to posttest.

Help-seeking behaviors were examined using the student self-reported classwork- and homework-checklist sheets. The heterogeneous instrumental students had the most self-reported requests for peer help and the most self-reported requests for teacher help.

Weekly group-level observations were completed to examine the help-seeking behaviors. Both heterogeneous groups engaged in conversation when help was necessary as indicated by group-level observations. Group-level observations noted that sometimes the identified expedient help seekers joined in to conversations. Group-level observations noted expedient help seekers seeking help quickly to obtain answers from

both teacher and peers by copying answers from peers more often than the instrumental help seekers.

Fifth Research Question

The fifth research question focused on the differences in help-seeking attitudes, perceptions, and behaviors (general help seeking, instrumental help seeking, expedient help seeking, and source of help) that arose when comparing across the homogeneous instrumental help-seeking group, the homogeneous expedient help-seeking group, and the two-heterogeneous help-seeking groupings that contained two instrumental and two expedient help seekers.

General help-seeking scores were highest for homogeneous-instrumental students at pretest and for expedient heterogeneous at posttest. Instrumental help-seeking scores were highest for homogeneous instrumental students at pretest and for instrumental heterogeneous students at posttest. Expedient help-seeking scores were highest for homogeneous expedient students at pretest and homogeneous expedient students at posttest. Formal help-seeking scores were highest for heterogeneous-instrumental students at pretest and homogeneous-expedient students at posttest. Informal help-seeking scores were highest for homogeneous-instrumental students at pretest and for both homogeneous expedient and heterogeneous expedient at posttest.

Help-seeking behaviors were examined using the student self-reported classwork- and homework-checklist sheets. Instrumental students sought the most general help, whereas the expedient students sought the least amount of general help as suggested by the group-level observations.

The heterogeneous expedient students self-reported the most help seeking during

homework from peers, whereas the homogeneous expedient students self-reported the least amount of help seeking during homework from peers. The homogeneous expedient students self-reported seeking help from the teacher during homework more frequently than the other groups did. The homogeneous expedient students self-reported using family members as help-seeking sources more frequently that the other groups did. The textbook was self-reported used by the homogeneous expedient and instrumental students more frequently than the other students did.

The students in the heterogeneous groups self-reported the most help seeking during class time from peers; the expedient students self-reported the least amount of help seeking from peers during class time. The instrumental students in the heterogeneous group self-reported the most help seeking from the teacher during class time; the instrumental students self-reported the least amount of help seeking from teacher during class time. The instrumental and heterogeneous expedient students self-reported using the textbook the most during class time, whereas the heterogeneous instrumental students self-reported using the textbook the least during class time.

Group-level observations were conducted to examine the help-seeking behaviors weekly. The students in the heterogeneous groups sought nearly as much general help as the homogeneous instrumental students did. The students who sought the most help from peers were in the instrumental group and the two heterogeneous groups, whereas the expedient students rarely sought help from peers.

The student teacher's observations were consistent with student self-reported help-seeking behavior for the randomly selected available pool for homogeneous-instrumental, homogeneous-expedient, heterogeneous-instrumental, and heterogeneous-

expedient help-seeking groupings. Instrumental help seekers tended to ask someone for more assistance, whether that source of help be from formal or informal sources. The most expedient help-seeking occurrences were observed to be from the heterogeneous groups and the expedient groups. Observations noted that students in the homogeneous-expedient grouping sought the least amount of help from either formal or informal sources. When the heterogeneous pairings occurred, observations noted that the expedient students tended to report more help seeking from both formal and informal sources of help and be observed to seek help more instrumental help frequently.

This section contains the correlation coefficients from the posttest help-seeking scales.

Posttest Pearson Product-Moment Correlation Coefficients

The results from the posttest Pearson product-moment correlation and analysis resulted in a moderately strong positive correlation between general help seeking and instrumental help seeking, help-seeking avoidance, and formal help seeking when controlling the overall error rate at the .05 level. A weak positive correlation occurred between general help seeking and informal help seeking, for unit test and for final grade. Weak statistically significant positive correlations were found between instrumental help seeking and formal help seeking, informal help seeking, unit test, and final grade when controlling the overall error rate. A moderately strong negative statistically significant correlation resulted between instrumental help seeking and help-seeking avoidance. Expedient help seeking has weak, yet statistically significant correlations between help-seeking threat and help-seeking avoidance. A moderate and statistically significant positive correlation occurred between help-seeking threat and help-seeking avoidance. A

moderately negative correlation exists between help-seeking avoidance and final grade. A moderately negative and statically significant correlation was found between formal help seeking and help-seeking avoidance. A moderately positive correlation resulted between informal help seeking and both unit test and final grade. A strong positive correlation was found between unit test and final grade.

The previous section presented the results and findings from the five research questions. The next section contains the limitations that occurred in this study.

Limitations

There are several limitations to this study that result from use of convenience samples (Girden, 2001, p. 66), intact classes, questionnaire data, the examination of small student groupings, and group-level observations rather than individual student observations.

First, this study used a convenience sample. This convenience sample is not representative of all possible middle-school science students (Girden, 2001, p. 66). Therefore, the results would apply only to those eighth-grade students who are similar to those in the study.

Second, the students used in this study were assigned randomly to their schedule at the beginning of the school year using the district computer system; however, this study did not employ a true random assignment of students to treatment. The intact classes were used due to convenience. Because the researcher used intact classes, there may have been possible classroom dynamic interactions that could have influenced the results; however, all care was taken to ensure that differences between classes were minimized.

Third, the collection and use of questionnaire data have several limitations. A major limitation of questionnaire methods is that it relies on a self-report method of data collection. The researcher cannot be certain of students' intentional deception, poor recollection of events, or misunderstanding of the questions (Girden, 2001, p. 66). Questionnaires provide only verbal descriptions of what students say they do or how they perceive something. Responses cannot always be taken as accurate descriptions or face value of what the respondents actually do or really perceive something. Participants may have displayed signs of acquiescence when responding to questionnaire items, especially because students were expected to complete daily classwork and homework checklists. These reasons can contribute to inaccuracies in the data. Additionally, questionnaire method is descriptive, not explanatory, and, therefore, cannot offer any new insight into cause-and-effect relationships of help seeking.

Next, student observation groups only consisted of a total of eight randomly selected students from the available pool of students with instrumental and expedient help-seeking style. Because such a small sample size was employed, results are not generalizable to a large number of students. Possible unforeseen group dynamics may have occurred within the small groupings impacting results. Furthermore, the student observations did not occur daily but only weekly, so detailed observations of student help-seeking behavior was not obtained. Furthermore, group-level observations were conducted. Results from the group-level observations cannot be compared to the self-reported individual help-seeking behavior results.

Additionally, where appropriate, data were organized and presented from the student group-level perspective. Sometimes it seemed necessary to organize and present

the data by help-seeking style as opposed to group membership, whereas at other times it seemed necessary to present data from the group-membership perspective as opposed to the help-seeking style perspective. For example, presenting the help-seeking summary scores for the individual groups made more sense because that was the foundation for forming the groups. However, group-level observations data were presented because that was how help-seeking behavior data were gathered.

This section addressed the limitations that occurred in this study. The next section contains the discussion of the findings presented in this study.

Discussion of Findings

This section contains the discussion of the findings. The data are organized around two themes: help-seeking attitudes and perceptions and help-seeking behaviors. The section contains the contributions that this study made to the literature and is followed by a discussion of the correlation coefficients between the scales of the help-seeking measure.

Help-Seeking Attitudes and Perceptions

Results of the analyses of help-seeking attitudes and perceptions (general, instrumental, expedient, help-seeking threat, help-seeking avoidance, and source of help) revealed a statistically significant decrease in scores on the help-seeking threat scale at posttest in comparison with pretest scores. One element of the treatment included altering students' achievement-goal orientation in order to change help-seeking attitudes and perceptions by presenting students with mastery-oriented lessons and activities embedded within an inquiry-based educational program. Results from previous research (Karabenick, 2003; Nelson-LeGall, 1989) suggest that students with higher performance-

oriented goals display higher attitudes and perceptions of help-seeking threat and help-seeking avoidance, whereas students operating under mastery-oriented goals tend to display lower attitudes and perceptions of help-seeking threat and avoidance. The profiles created by Karabenick (2003) suggest that performance-oriented students tend to be expedient help seekers and that mastery-oriented students tend to be instrumental help seekers.

Because help-seeking intentions rest upon achievement goals, findings from this study support this claim as the help-seeking avoidance scale had lower scores at posttest in comparison with pretest scores. Results from Ryan and Pintrich (1997) and Tanaka, Murakami, Okuno, and Yamauchi (2002) suggest that students in a mastery-oriented learning environment do not avoid seeking help when help is needed as students operating under performance-oriented learning environments tend to do (Butler, 1998; Ryan & Pintrich; Tanaka et al.), thereby possessing high attitudes and perceptions of help-seeking avoidance. Supporting student learning with activities, lessons, and questions emphasizing the process of learning thereby altering achievement-goal perspective providing students with a foundation based on mastery-oriented goals rather than focusing on the outcomes or products influenced student help-seeking avoidance producing a favorable lower attitude and perception toward help-seeking avoidance after the 5-week intervention unit.

Teaching students how to ask for appropriate help, how to provide appropriate help, and encouraging students to operate under mastery-oriented achievement goals contributed to the increase in help-seeking attitude and perception toward informal help seeking. There was an increase in informal help-seeking scores over the 5-week

intervention unit. Students had instructional time similar to the students in Nelson-LeGall and Glor-Scheib's (1985) investigation of how mathematics and reading class-task, recitation, and recitation-task activities foster help seeking in the classroom. As classroom structure and help-seeking reminders allowed students to interact to seek help, students perceived that they could seek more help from each other during classroom tasks and activities increasing their informal help-seeking attitudes and perceptions. Students perceived that they were able to ask more questions and seek more peer help.

Help-seeking style is influenced by achievement-goal orientation (Nelson-LeGall, 1989). One aspect of help seeking is expedient help seeking (Karabenick, 2001). Using an academic strategy that alters achievement-goal orientation incorporates a strategy immediately in the classroom environment. The new strategy provides students with a highly strategic plan and script that students use to interact with (Nelson Le-Gall, 1990; Ryan et al., 2001). This strategy encourages students not to perceive that they predominantly rely on expedient help seeking. Student attitudes and perceptions measured by the pretest-posttest expedient help-seeking scale decreased suggesting that students were not as inclined to perceive making expedient help-seeking requests when placed in a mastery-oriented learning environment as students progressed through laboratory activities in the science classroom now focusing on the process of science rather than the performance outcome.

The research suggests that students who participate in a mastery-oriented learning environment paired with other mastery-oriented learners demonstrate constructive increases in help-seeking attitudes and perceptions specifically toward general and instrumental help seeking (Nelson-LeGall, 1989) from either formal or informal sources

of help (Karabenick, 2003). Furthermore, students grouped by instrumental help-seeking attitudes and perceptions produce lower levels of attitudes and perceptions in expedient help seeking (Nelson-LeGall). The general help-seeking behaviors contradict what is indicated by the previous research. When Butler and Neuman (1995) investigated the attitudes and perceptions of help seeking by altering the goal-focus instructions during puzzle-solving problems, the researchers found that when students operated under mastery-oriented achievement goals, they sought more help. This study's results contradict Butler and Neuman indicating that academic achievement goals take longer to be altered over short-term time periods by focusing directions or environment but instead suggest that achievement goals take years to develop (Butler, 2008). Perhaps achievement goal perspectives are also context specific and are linked to various subject domains.

Because the students in the instrumental group operated under mastery-oriented-achievement goals established within the classroom, their help-seeking attitudes and perceptions indicate that their general and instrumental help-seeking attitudes and perceptions were strong and should have increased (Nelson-LeGall; Tanaka et al., 2002); however, general help-seeking attitudes and perceptions decreased from pretest to posttest, contradicting previous research's implications.

Students with instrumental help-seeking tendencies are guided by mastery-oriented achievement goals (Karabenick, 2001; Tanaka et al., 2002) and desire only enough help to be able to resume working independently to maintain autonomy (Butler, 1998). This decrease in expedient help seeking was anticipated and is consistent with the decrease for the attitudes and perceptions toward expedient help seeking from pretest to

posttest. Because instrumental students perceived that they were only going to seek help after exhausting all available resources, instrumental students maintained autonomy over their learning situation (Butler). This result supports Butler's result that mathematics students prefer independent mastery instead of masking incompetence. Students are able to monitor cognitively their learning situation and environment to be able to perceive when help when necessary, especially when placed into a mastery-oriented learning environment (Nelson-LeGall, 1984).

Instrumental students showed a decrease in attitudes and perceptions of informal help seeking from pretest to posttest (Karabenick & Knapp, 1991). Perhaps instrumental students perceived that informal sources of help are not as reliable as formal help sources. Engaging in instrumental activities allows instrumental students to maintain autonomy over the learning environment (Butler, 1998) preferring and perceiving the need to seek help from informal sources only when absolutely necessary.

Attitudes and perceptions toward general help seeking increased for the expedient students from pretest to posttest. Altering achievement goals by placing expedient students into a mastery-oriented environment with mastery-oriented directions increased general help-seeking attitudes and perceptions guided by performance-oriented goals. This result is backed by the research constructed by Butler and Neuman (1995). The students in Butler and Neuman's study increased general help seeking when placed into a puzzle-solving situation that was prefaced with mastery-oriented directions. Collectively the mastery-oriented directions and lessons influenced the general help-seeking attitudes and perceptions of the expedient students.

The expedient students showed a decrease in the attitudes and perceptions of instrumental help seeking from pretest to posttest. Even though the students in the expedient group operating under mastery-oriented-achievement goals established within the classroom, the attitudes and perceptions toward instrumental help seeking should have increased (Nelson-LeGall; Tanaka et al., 2002); however, perhaps being grouped with students who share similar performance-oriented values and receiving a mastery-oriented treatment were not a benefit to them (Butler, 2008). Furthermore, the expedient students did not have direct contact with instrumental students who could model higher attitudes and perceptions of instrumental help seeking. Similar to Butler (2008), being placed into a performance-oriented environment negatively impacts instrumental help-seeking attitudes of the students.

The expedient students showed a decrease in attitude and perception toward expedient help seeking from pretest to posttest. Butler's (2008) results do support this decrease in expedient help seeking. Butler found that when mathematics students were placed into ability groupings based on achievement goals, performance-oriented goals undermined instrumental help seeking. To account for the decrease in the self-reported pretest-posttest expedient help-seeking scores, either the expedient students acquiesced when completing the help-seeking instrument during the posttest, or they perceived that asking for help was the desired attitude and perception that the teacher wanted the expedient students to report. It is possible that the mastery-oriented treatment and help-seeking strategies had a positive impact on expedient help-seeking attitudes and perceptions for the expedient students.

There was an increase in attitudes and perceptions of formal help seeking from

pretest to posttest for the expedient students. The mastery-oriented educational program and help-seeking intervention program influenced the formal help-seeking attitudes and perceptions of this group of expedient students by making formal help seeking an option for them to obtain help. It does not appear that being placed with other expedient students with similar achievement goals undermined the treatment (Butler, 2008).

The expedient group showed an increase in attitudes and perceptions of informal help seeking from pretest to posttest. Typically expedient help seekers display higher attitudes and perceptions of help-seeking threat and anxiety (Karabenick, 2003). Because of the higher levels of help-seeking threat and anxiety, expedient students avoid seeking help from peers to prevent damage to their self-beliefs (Covington, 2000). Perhaps the mastery-oriented treatment did have a positive benefit on the expedient students slightly increasing informal help-seeking attitudes and perceptions.

Attitudes and perceptions toward expedient help seeking decreased in the heterogeneous instrumental students. The lessons promoted mastery-oriented achievement goals. The lessons were combined with appropriate help-seeking strategies that students could adopt into their help-seeking attitudes and perceptions. This treatment benefited the instrumental students because students were encouraged not to seek expedient help from teachers or peers (Karabenick & Knapp, 1991). The results obtained from Karabenick and Knapp's study suggest that students who participate in instrumental activities tend to perform better academically. Better academic performance stems from a deeper understanding of the material that only can be obtained when operating under mastery-oriented academic goals (Butler, 2008). Possessing low-instrumental help-seeking (Karabenick, 2008) attitudes and perceptions and high-expedient help-seeking

attitudes and perceptions tend not to result in the students developing a strong understanding of the material (Karabenick).

A decrease in attitudes and perceptions toward formal help seeking occurred for the heterogeneous-instrumental students; however, this decline is not necessarily a concern for educators. These students may have been maintaining autonomy over their learning situation like the students did in Nelson-LeGall (1989) study actively monitoring their cognitive understanding knowing when help was needed. Perhaps the instrumental students did not perceive the need for as much help because the students were able appropriately to use all available resources to be successful.

The heterogeneous-instrumental students self-reported a decrease in attitudes and perceptions of informal help seeking from pretest to posttest. This decline in the attitude and perception of informal help seeking is consistent with the research completed by Karabenick and Knapp (1991). This study attempted to increase student help-seeking attitudes and perceptions by presenting informal help seeking as a viable option for students. Peer help is available immediately due to their proximity and availability, and the students perceived using peers as an available resource.

Heterogeneous expedient students self-reported an increase in instrumental help-seeking attitude and perception. This result is consistent with information contained in previous literature (Nelson-LeGall, 1989; Tanaka et al., 2002). Students who develop mastery-oriented achievement goals abandoning their performance-oriented achievement goals develop stronger instrumental help-seeking attitudes and perceptions. This change in instrumental help seeking may be due to an altering achievement-goal orientation helping students become less performance oriented and more mastery oriented (Nelson-

LeGall; Tanaka et al.) as the students completed mastery-oriented lessons. The combination group of instrumental and expedient students allowed for an interaction in which achievement-goals and help-seeking attitudes and perceptions could be altered by group orientation.

As anticipated, general help seeking increased for the heterogeneous-expedient students from pretest to posttest. General help seeking is guided by achievement goals (Nelson-LeGall, 1989). Using the mastery-oriented lessons and directions (Butler, 2008; Butler & Neuman, 1995; Ryan, Patrick, & Shim, 2005; Turner et al., 2002) helped alter achievement goals for the heterogeneous expedient students. Furthermore, this heterogeneous pairing may have assisted performance-oriented students to become less performance oriented as the expedient students adopted more mastery-oriented goals (Butler, 2008).

There was a decrease in self-reported expedient help-seeking attitudes and perceptions from pretest to posttest for the heterogeneous expedient students. It appears that the daily reminders of appropriate help seeking (Nelson-LeGall, 1989; Tanaka et al., 2002) and mastery-oriented achievement goals (Butler, 2008; Butler & Neuman, 1995) helped lower the help-seeking attitudes and perceptions of expedient help seeking over the 5-week time period for the expedient students.

An increase in attitude and perception of formal help seeking for the heterogeneous expedient students occurred from pretest to posttest. Perhaps the daily reminders provided the expedient students with enough support so that they could find formal help seeking as a possible option for their help-seeking needs. The students may have been able to understand that asking for help from formal sources was a very good

place to receive quality information.

An increase in the attitudes and perceptions of informal help seeking was observed from pretest to posttest for the heterogeneous expedient students. Daily reminders about the benefits of informal help seeking gave the expedient students another source of help. The students may have been able to understand that asking for help from informal sources was a good place to receive information when other sources were either unavailable. The students also perceived that asking for help from peers was not necessarily a form of cheating.

The self-reported decrease in general help-seeking score for the instrumental, and increase in general help-seeking score for the expedient students were inconsistent with the previous literature. Although all students were placed into a treatment that consisted of being instructed how to seek and provide appropriate help, as well as participate in mastery-oriented lessons and activities, not all students' achievement goals changed from performance oriented to mastery oriented (Nelson-Le Gall, 1989; Tanaka et al., 2002). Results provided by Nelson-LeGall and Tanaka et al. indicated that students in mastery-oriented learning environments tend to exhibit more task-focused help-seeking bids than students in performance-oriented learning environments. Perhaps the heterogeneous groupings had a greater impact on the achievement goals and help-seeking attitudes and perceptions of the students than would be suggested by the initial results.

Instrumental help-seeking scores increased in all groups except for the homogeneous instrumental group. This result was not anticipated. The researcher expected all groups to increase in instrumental help seeking (Karabenick, 2003; Nelson-LeGall, 1989; Tanaka et al., 2002). Instrumental help-seeking style is based on

achievement-goal orientation. Students with instrumental help-seeking tendencies operate under mastery-oriented achievement goals (Karabenick, 2003). Karabenick's results do not account for the decrease in instrumental help seeking for the homogeneous-instrumental students. Instrumental students' achievement goals were supported in the classroom environment; therefore, instrumental students should not display a strong tendency to perceive low levels of instrumental help because high attitudes and perceptions toward help-seeking avoidance contradicts their mastery-oriented achievement-goal orientation (Butler, 1998). Butler's (1998) results described student desire to maintain autonomy striving for independent mastery only seeking help when necessary.

The decrease in expedient help-seeking attitudes and perceptions occurred for all groups and was anticipated because help-seeking style is dependent upon achievement-goal orientation (Butler, 1998; Nelson-LeGall, 1989). Because performance achievement goals were not supported and mastery-oriented achievement goals were supported, the decline in expedient help seeking occurred. The decrease in self-reported attitudes and perceptions of expedient help seeking is consistent also with results provided by Bulter's study indicating that students desired to maintain autonomy over their learning environment.

Expedient students self-reported increases for the attitudes and perceptions of formal help seeking from pretest to posttest. Seeking help from formal sources is atypical for students who operate under performance-oriented values. Typically expedient students possess higher attitudes and perceptions of help-seeking threat and avoidance and would not be willing to seek help from formal sources. This increase in

formal help seeking was anticipated. The self-reported decrease in formal help seeking for the instrumental students is supported by the results provided Butler (1998). Because instrumental students operate under mastery-oriented achievement goals and the treatment included reminding students about the help-seeking options, the instrumental students maintained autonomy over their learning situation and exhausted all resources before asking for help from the formal source.

The self-reported decrease for the instrumental students' informal help-seeking scores can be accounted for by Karabenick and Knapp (1991) and Nelson-LeGall and Glor-Scheib (1985); however, the results found by Karabenick and Knapp and Nelson-LeGall and Glor-Scheib also can explain the increase in informal help-seeking scores for the expedient students. Karabenick and Knapp's results suggested that instrumental students preferred to engage in instrumental activities instead of seeking help from formal sources. Nelson-LeGall and Glor-Scheib's results indicated that because students participated in class activities that allowed them to collaborate with other students, the students were able to access each other as an available help-seeking resource. Expedient students typically prefer seeking help from informal sources, so this increase in informal help seeking can be accounted for because expedient students tend to possess higher levels of attitudes and perceptions toward help-seeking threat and avoidance.

This section contained the discussion of findings for the attitudes and perceptions of help seeking theme. The next section contains the discussion of the findings for the help-seeking behaviors that were self-reported in the classwork and homework checklists and observed in the homogeneous and expedient groupings.

Help-Seeking Behaviors

Help-seeking behaviors were examined during the 5-week intervention period using the self-reported homework- and classwork-checklist sheets. Students responded to the following question, "How many times do you ask for help from the following sources with science during the class period?" Response choices include the following sources: peer, teacher, Internet, textbook, and personal notebook at the end of the class period. Students self-reported on the homework- and classwork-checklist sheets that they were able to solicit more direct nonexpedient requests indicating need for help from both peers and teacher when they detected cognitive deficiencies.

The most self-reported help-seeking requests for classwork were made of peers, the textbook, and of the teacher. The treatment included teaching students appropriate and inappropriate help-seeking strategies. Students were taught what was appropriate for seeking help from both peers and teachers by providing students with behavioral strategies that they could incorporate into the dialogue when seeking help. Students maintained autonomy satisfying mastery-oriented goals by using the textbook as instrumental help. Students were taught behavioral strategies of how to provide help to each other by only giving enough information to get each other working on the assignment again. Help-seeking behavioral strategies included providing students with page numbers from the textbook and responding to initial inquiries for help using questions. The inquiry-based lessons consisted of activities and questions that emphasized the process of learning rather than focusing on outcomes or products. Taken together, these strategies incorporated in the treatment helped middle-school students become more strategic help seekers.

The students in this study operated under similar class-task and recitation-task settings (Nelson-LeGall & Glor-Scheib, 1985) initiating their own conversations, discussions, and tasks as they worked in their collaboration groups with peers on the inquiry-based lessons. Similar to the students in Nelson-LeGall and Glor-Scheib's study, students were able to seek help during recitation-task and class-task time. Because students were allowed to initiate tasks during the inquiry-based mastery-oriented lessons, these middle-school students exhibited similar results to Nelson-LeGall and Glor-Scheib's students seeking more help from informal sources rather than from formal sources. Furthermore, this result is credible as student help is easier to obtain and more readily available in a classroom with 30 or more students and only one or two teachers.

Males and females self-reported similar homework times. The most self-reported help-seeking behaviors of students during homework were made of peers, the textbook, family members, and the Internet. Because the treatment included teaching students appropriate and inappropriate help-seeking strategies, the strategies could be included in daily life and were used beyond the classroom. Students incorporated the behavioral strategies that into the dialogue when seeking help from peers and family members. Students maintained autonomy and operated under mastery-oriented goals by using the textbook as an instrumental source in the home environment too. Strategies incorporated in the treatment helped middle-school students become more strategic help seekers in the home environment.

The students in the homogeneous groups and the heterogeneous groups self-reported homework study time that ranged from 0.1 hours to 1.8 hours. The least amount of homework time and the greatest amount of homework time were reported by the

expedient students. When examining the study-time data of the homogeneous expedient in comparison with unit test and final grades the results are credible. The homogeneous-expedient students reported the lowest homework study time and had the lowest unit test and final grades. Reported study times of nearly an hour per week would indicate that students would have higher final grades.

The instrumental group-level observations obtained from in this study suggest that the instrumental group was observed to ask for more general help more frequently than the other help-seeking groups did. Because instrumental students are interested in learning to benefit their situation over the long term, it is not surprising that instrumental students demonstrate a preference for instrumental help-seeking activities choosing to exhaust formal help-seeking resources (textbooks, classroom resources, and teacher) including being observed to use other people as a help-seeking resource.

The help-seeking behavior data obtained from the instrumental students suggest that instrumental students relied upon the textbook more often for support and help and asking for help that would assist them to solve problems. As suggested by Butler (1998) and Karabenick and Knapp (1991) instrumental students prefer to engage in instrumental help-seeking activities that allow them to maintain autonomy over their learning environment and exhaust all available resources to learn the material. Instrumental students' informal help-seeking behaviors indicate that they will not rely predominantly on informal help seeking. Karabenick and Knapp found that college students are more likely to engage in instrumental activities to improve performance, such as using the textbook or initiating their own tasks, rather than to seek help from informal sources. Engaging in instrumental activities allows instrumental help seekers to maintain

autonomy over the learning environment (Butler, 1998). Combined these two statements suggest that instrumental students will exhaust all other resources before seeking help from informal sources; however, even though using available resources to learn the correct answers, the instrumental still perceived informal sources of help to be a viable option for help seeking. The literature supports the result.

Expedient students self-reported on the classwork and homework checklists more textbook help-seeking bids and more Internet use than the other groups did. This result contradicted the results provided by Butler and Neuman (1995). Butler and Neuman's results suggest that mastery-oriented directions produce more instrumental help seeking than performance-oriented directions do. The researcher anticipated that expedient students should display similar help-seeking behaviors after participating in a mastery-oriented inquiry-based educational unit. Expedient students may have been attempting to complete homework; however, they may have been simply using the textbook or Internet unconstructively, rather than using the two sources for general help-seeking purposes to complete homework.

Expedient help seekers asked for expedient help more often from the teacher than other students in the groups did and by surrendering learning autonomy (Butler, 1998) to the teacher. The expedient help seekers did not have other students within their group to seek help from or model their help-seeking behavior after, and the expedient students were forced to seek help from the teacher; however, being presented with no other option to seek help from the teacher may have helped increased formal help seeking benefiting the expedient students. It is likely that being placed in a heterogeneous grouping may

provide additional support to the expedient students providing the expedient students with other role models and mastery-oriented achievement goals (Butler, 2008).

Group-level behavior observations made of the homogeneous-expedient students suggest that expedient students would employ help-seeking avoidance behaviors because they have higher attitude and perceptions of help-seeking threat (Karabenick, 2003). The expedient group asked for assistance more from the teacher than from peers contradicting the profile suggested by Karabenick that expedient students would avoid seeking help from formal sources. The group-level observations noted that there was limited interaction between expedient students suggesting being paired with students with similar performance-oriented values may have negatively impacted the mastery-oriented treatment (Butler, 2008). The expedient students were observed on the group level to ask for expedient help more frequently from the teacher than students in the other groupings did. Additionally, the expedient group often asked the teacher for help as an expedient way to obtain help by blatantly asking for the correct answer while completing in-class lessons. The expedient students appear to have been looking for quick answers rather than attempting to develop an understanding of the learning material as evidenced by their decrease in expedient help seeking.

Behavioral observations noted that there were limited interactions among expedient students and that the expedient students did not interact with each other very often. Classroom norms (Ryan et al., 2001) combined with achievement goals (Nelson-LeGall, 1989) craft classroom learning environments. The expedient students may have perceived that general help seeking was the same as either instrumental or expedient help seeking and that any type of help seeking was better than no help seeking at all. The

expedient help-seeking students were not influenced by the mastery-oriented environment when seeking informal help as they still operated under performance-oriented-achievement goals (Nelson-LeGall, 1989) asking for expedient help from the teacher rather than instrumentally seeking help from either the teacher or other sources. The expedient students may have acquiesced when they were seeking help from the teacher thinking that help seeking was the behavior that the teacher really wanted to observe from the students. These results suggest that the homogeneous expedient grouping did not help the students become skilled at collaborating with peers or seeking any better help than before the treatment occurred (Butler, 2008).

Group-level behavior observations noted that instrumental students in the heterogeneous groupings engaged in conversation and looked for answers by themselves only seeking help when necessary. Because the instrumental students only sought help when necessary, the instrumental help seekers preserved autonomy (Nelson-LeGall, 1989) over their learning situation. The group-level observations found that instrumental help seekers whether paired in homogeneous or heterogeneous groupings tended to make more help-seeking requests of someone else for assistance than the students in the other groupings did. The instrumental students sought more help to learn to solve problems to find answers out by him- or herself. Instrumental students were observed to seek help almost as often as the students in the homogeneous instrumental grouping did.

The heterogeneous-instrumental students engaged in help-seeking behaviors from other students and learned to solve problems to find answers by himself or herself, thereby maintaining autonomy over the situation like the students did in Nelson-LeGall (1989) study. Additionally Karabenick and Knapp (1991) asserted that students with

strong regulation skills are able to monitor their own behaviors and to know when appropriately to seek help. Perhaps the instrumental students did not need as much help because the students were able appropriately to engage in behaviors to use the resources that were made available to them allowing the instrumental students to be successful.

Instrumental students in the heterogeneous groupings self-reported using the textbook for assistance. Using the textbook allowed the students to maintain autonomy (Nelson-LeGall, 1989) over their learning situation. The girls in Nelson-LeGall's study who operated using a high-mastery orientation made more task-focused bids for help than the girls in the low-mastery condition did. Because instrumental students were placed into a mastery-oriented learning environment, they were able to use more task-focused help-seeking behaviors to obtain help. Using the textbook was one of these examples of task-focused bids.

The heterogeneous-instrumental students demonstrated a preference for instrumental help using strategic help-seeking behaviors to exhaust all available resources. Operating under mastery-oriented achievement goals may have altered general help-seeking attitudes and perceptions of the heterogeneous-expedient students. Perhaps, the instrumental students acted as role models for the expedient students and demonstrated instrumental help-seeking behaviors through their conversations and behaviors. The expedient students were able to emulate the behaviors of the instrumental students and become more like the instrumental students.

Heterogeneous-expedient students were able to participate in conversations and observe the actions and behaviors of the instrumental students. The expedient help seekers could emulate the instrumental help seekers behaviors, thereby not only changing

the instrumental help-seeking attitudes and perceptions, but altering instrumental help-seeking behaviors.

The heterogeneous-expedient students self-reported using peers and teachers more frequently than the instrumental students group did. Participating in a mastery-oriented treatment program assisted student formal and informal help seeking. As students participated in the mastery-oriented education program and treatment, the heterogeneous-expedient students were able to engage in activities, like conversations, that would better their performance (Karabenick & Knapp, 1991) using formal and informal help sources. The heterogeneous-expedient students were able to engage in appropriate help-seeking behaviors by having conversations with the instrumental students. The heterogeneous-instrumental students modeled appropriate general, instrumental, expedient, formal, and informal help-seeking behaviors based on the foundation of mastery-oriented achievement goals that was emphasized in the treatment and daily reminders. It appears that treatment produced a favorable result as the expedient students participated in formal help-seeking behaviors.

Group-level behavior observations noted that heterogeneous-expedient students were observed to obtain answers from the textbook more frequently than any other group. The expedient students were observed to seek help almost as often as the instrumental group did. This shift in help-seeking behaviors may be due to a change in achievement goal structure as instrumental students worked in close proximity with expedient students benefiting from the pairing.

Heterogeneous-expedient students were observed to seek help quickly to obtain answers from both teacher and peers by copying answers from peers more often than

heterogeneous-instrumental students (Karabenick, 2003; Wolters et al., 2003). The copying of answers and use of expedient help-seeking behavior strategies contradicts results provided by Butler and Neuman (1995) and Turner et al. (2002). Butler and Neuman found that achievement-goal orientation could be altered by placing students into mastery-oriented or performance-oriented conditions during a puzzle-solving activity. Modifying achievement-goal orientation appears to take longer than 5 weeks. Butler (2008) asserted that students guided by performance goals undermine instrumental help-seeking attitudes and perceptions, thereby promoting expedient help seeking. Even though repeated attempts to encourage students to look for appropriate forms of instrumental help, it is difficult to change achievement goal orientation (Butler, 2008; Butler & Neuman, 1995) and help-seeking styles (Nelson-LeGall, 1989; Tanaka et al., 2002) in a 5-week time period. More than one expedient student in a group does not appear to have that positive of an impact on the expedient students.

Group-level observations from the heterogeneous expedient students found a large number of help-seeking requests from the teacher. The treatment attempted to assist expedient students with formal help seeking behaviors, making formal help seeking more accessible and approachable. The increase in formal help seeking was consistent with a previous study (Nelson-LeGall & Glor-Scheib, 1985) because the treatment promoted the behavior of student interaction with the teacher during class time. The expedient students appear to have benefited from participating in the treatment seeking more formal, albeit expedient help, help during the 5-week intervention unit.

Informal help seeking was noted in the group-level observations of the heterogeneous groups. Observations included the expedient students joining into

conversations with the instrumental students. Participating in a mastery-oriented treatment program combined with help-seeking strategies assisted students during informal help seeking. As students participated in the mastery-oriented education program, the students were able to engage in help-seeking activities that would better their performance (Karabenick & Knapp, 1991).

The group-level observations provided by the heterogeneous-expedient students noted that expedient students were observed to seek help quickly to obtain answers from both teacher and peers. Expedient students were observed to copying answers from peers more frequently than instrumental help seekers were observed to do. Moreover, the expedient students in the homogeneous group asked for expedient help from the teacher more frequently than other students did. Butler's (1998) study cannot account for the contradicting increase in expedient help seeking observations that were made. The expedient students may have acquiesced when completing the instrument accounting for the decrease in expedient help-seeking style. Furthermore, any type of help seeking from peers would mean that the expedient students were attempting to learn the material so that they had the information to better prepare for tests and quizzes.

Expedient help seekers were observed to ask for expedient help more frequently from the teacher than other students in the groups did, thereby surrendering learning autonomy (Butler, 1998) to the teacher. The mastery-oriented educational program did not influence the expedient help-seeking behavior of this group of expedient students. It appears as if the expedient students were forced to seek help from the teacher because they were not adept at using the other help-seeking options immediately available. Because they failed to use other behavioral help-seeking strategies immediately available,

the expedient students surrendered all autonomy. The expedient students may have been using the behavior that they though the teacher wanted to see after being primed with the help-seeking training.

Group-level observations that were made suggest that as long as there was an instrumental student in the group, the students in those groups were observed to ask for help when necessary. Instrumental students were observed to ask more questions for assistance, to use the textbook for assistance, and to converse with peers when help was necessary.

There are several contributions that this study adds to the previous literature. Previous studies used college students (Krabenick, 2003) and mathematic students (Butler, 1998, 2008). Other studies have investigated the help-seeking behaviors during reading and mathematic lessons (Butler, 1998) as well as puzzle-solving problems (Nelson-LeGall, 1989). These previous investigations did not examine the attitudes, perceptions, and behaviors when instrumental help seekers were grouped together in a science classroom. Furthermore, this study employed a treatment that included a help-seeking intervention program that students could implement into their academic lives.

Specifically, this study contributes to the previous studies by Karabenick (2003), Butler (1998, 2008), and Ryan et al. (2001), because this study examined help-seeking attitudes and perceptions of middle-school students grouped by help-seeking styles. The interactions that occur when students are with students with similar and different help-seeking styles bring about interesting dialogue for educators. Classroom dynamic is always a concern for educators and forming groups based on help-seeking style is a way

to support student academic growth when teachers consider more than just academic differences between students.

None of the studies in the existing literature examined middle-school behavior interactions with regard to achievement-goal orientation, help-seeking style, and source of help. This study examined the help-seeking behaviors of the middle-school students after grouping students by help-seeking styles. None of the existing studies have considered the impact that homogeneous instrumental, homogeneous expedient, and heterogeneous groupings would have on help-seeking behaviors.

Discussion for this research project was challenging because the help-seeking literature lacked any specific evidence regarding the instrumental, expedient, and heterogeneous groups. This study added to the literature base because it investigated the small-group interaction that occurs when students with similar and different help-seeking styles were grouped together for a long-term intervention in a mastery-oriented learning environment.

Although studies examining the in class help-seeking behaviors of students existed, no previous studies were located that examined the help-seeking behaviors of students during homework time using peer, teacher, family member, Internet, textbook, and personal notebook as sources. Additionally, no previous studies were identified that examined the help-seeking behaviors of students using the peer, teacher, Internet, textbook, and personal notebook as sources.

This section contained the discussion of the results to the research questions organized by help-seeking attitudes and perceptions and help-seeking behaviors. The

next section contains the discussion of the results obtained from the posttest Pearson-product moment correlations from this study.

Posttest Pearson Product-Moment Correlation Coefficients

The posttest Pearson product-moment correlation coefficients from the pretest summary are consistent with previous results (Karabenick, 2003) suggesting that different constructs were measured when controlling the overall error rate at the .05 level. The present findings suggest that eighth-grade science students perceived help seeking in different ways than their older counterparts do; however, some results obtained from the correlational analysis vary slightly when compared with previous results (Bembenutty, 2006; Karabenick, 2001, 2003).

Karabenick (2003) identified a stronger correlation between help-seeking threat and help-seeking avoidance, and results from this study produced a small correlation between the two same variables. Students participated in an educational program that emphasized mastery-oriented learning objectives and directions. The treatment also included instructing students how to seek help using help-seeking strategies. The eighth-grade students in this study did not have as strong perceptions of help-seeking threat or avoidance as the older students did. Perhaps as students progress through high school and college (Karabenick, 2003; Wolters et al., 2003), students perceive their learning environment to be more performance oriented. Students are enrolled in larger classes more competitive classes in which performance dictates future opportunities. Furthermore, unlike their older counterparts, middle-school students are not tracked or self-selected (Butler, 2008; Karabenick) into science classes providing a more

academically diverse group of learners. Smaller class sizes common to a middle school may impact how students view help-seeking threat and help-seeking avoidance (Butler).

Karabenick's (2001) correlational result between expedient help seeking and help-seeking threat was stronger; however, the relationship between expedient help seeking help-seeking avoidance was similar. Perhaps the age of the students or the smaller classroom environment played a role in how middle-school students perceived expedient help or help-seeking threat. The treatment offered in this study supported mastery-oriented values explaining the slightly smaller result. Therefore, the middle-school students perceived their environment to be more mastery-oriented and did not perceive help-seeking threat and desire expedient help as readily (Butler, 2008). Students perceived the environment to be a place in which the process of learning was valued over the outcomes or performances (Nelson-LeGall, 1989). Older students are pitted against others when performance or outcomes are emphasized.

A negative relationship was identified between instrumental help seeking and help-seeking threat, help-seeking avoidance, and expedient help seeking. Karabenick (2001) identified a similar result. Students operating under mastery-oriented views tend to display instrumental help-seeking styles (Nelson-LeGall, 1989; Karabenick, 2003; Ryan, Hicks, & Midgley, 1997; Tanaka et al., 2002) in which low levels of help-seeking threat, help-seeking avoidance, and expedient help seeking occur. Middle-school students in smaller classes possess stronger instrumental help-seeking attitudes and perceptions at a young age. Perhaps lower levels of help-seeking threat, help-seeking avoidance, and expedient help seeking occur because the middle-school students perceive a more mastery-oriented and less performance-oriented environment (Butler, 2008).

Last, the relationships between formal help seeking and help-seeking avoidance and instrumental help seeking are the most different from previous research (Karabenick, 2001). This study found a moderate negative relationship between formal help seeking and help-seeking avoidance suggesting that students who are formal help seekers do not show high levels of help-seeking avoidance. The treatment in this study consisted of placing students into a mastery-oriented learning environment that emphasized the process of learning science skills and material rather than focusing on performance, comparison with other students, final outcomes, or grades. The treatment also provided students with a means to seek appropriate help in the classroom setting from formal sources. Students were provided with class-task and recitation-task time similar to the students in Nelson-LeGall and Glor-Scheib's (1985) study time in which students were able to initiate their own help-seeking behaviors. The treatment provided students with help-seeking strategies to be able to seek help from formal sources during work time. Therefore, a negative relationship between formal help seeking and help-seeking avoidance is supported.

Formal help seeking and instrumental help seeking share a moderate positive correlation, whereas previous research reported a statistically significant weak relationship (Karabenick). The treatment provided students with a mastery-oriented learning environment and strategies to seek appropriate help in the classroom setting from formal sources. Karabenick and Knapp (1991) found that students participating in instrumental activities preferred to participate in instrumental activities that would help the students perform better. These instrumental activities include seeking help from a formal source as long as the source of help only provided enough help to get the student

working independently again maintaining autonomy (Butler, 1998). Similar to their older counterparts, middle-school students demonstrated a preference for formal help (Karabenick, 2003) probably showing a preference for help seeking from a formal source because that source probably yielded higher-quality information than information from peers provided.

Consistent with previous results, students who willingly seek general help desire instrumental help and do not desire expedient help. Students who prefer instrumental help prefer hints, want to be able to transfer knowledge acquired in one situation to other situations, and are interested in learning for the sake of learning (Karabenick, 1998, 2003; Nelson-LeGall, 1985; Wolters et al., 2003). As instrumental help seekers desire to maintain their autonomy in their own learning situation (Butler, 1998), instrumental help seekers do not share the same values as expedient help seekers. Expedient help seekers will cheat, copy, or minimize effort to produce short-term academic gains (Karabenick, 1998, 2003; Nelson-LeGall, 1985; Wolters et al., 2003). Instrumental help-seekers also prefer to receive the best quality information, and therefore, seek help from formal sources (Karabenick & Knapp, 1991).

Instrumental help seekers have low levels of help-seeking threat, as help-seeking threat is a characteristic of expedient help seeking (Ryan, Hicks, & Midgley, 1997) not of instrumental help seeking. As instrumental help seekers are interested in the process of learning, rather than the outcome or grade, they are willing to find the necessary help that will provide them with long-term gains (Karabenick & Knapp, 1991), knowing that long-term gains include receiving the most accurate information from formal sources.

The results from the posttest Pearson product-moment correlation coefficient analysis produced a moderately strong positive correlation between general help seeking and instrumental help seeking and formal help seeking when controlling the overall error rate at the .05 level. A weak positive correlation between general help seeking and informal help seeking, unit test, and final grade existed as well. A very moderately strong negative correlation occurred between general help seeking and help-seeking avoidance was generated. Weak positive correlations transpired between instrumental help seeking and formal help seeking, informal help seeking, unit test, and final grade. A moderately strong negative statistically significant correlation existed between instrumental help seeking and help-seeking avoidance. Expedient help seeking is weakly correlated with help-seeking threat and help-seeking avoidance. A moderate positive correlation occurred between help-seeking threat and help-seeking avoidance. Help-seeking avoidance and formal help seeking were negatively correlated. Help-seeking avoidance was negatively correlated with final grade. A moderately positive correlation was present between informal help seeking and unit test and final grade. A strong positive correlation existed between unit test and final grade.

Consistent with previous studies completed by Butler and Neuman (1995), Turner et al. (2002), Butler (2008), Ryan et al. (2005), and Wolters et al. (2003), help-seeking intentions rest on achievement-goal orientation. Students with mastery-oriented achievement goals will seek more general help than students with performance-oriented achievement goals. The students in this study participated in a treatment consisting of mastery-oriented activities, lessons, and directions. The treatment also included daily reminders about how to seek appropriate help from formal and informal sources. Similar

to the students in Butler and Neuman's study, the students received mastery-oriented directions encouraging the students actively to seek help from peers when help was necessary supporting the correlation between general help seeking and informal help seeking. Last, students who seek help will perform better than students who do not seek help. Results from studies by Nelson-LeGall (1984), Butler and Neuman (1995), Ryan et al. (2005), Butler (2008), and Moore (2008) suggest, students understand when they need to seek because they are unable to understand the content material. The students who seek help logically will outperform students who avoid seeking help, explaining the positive correlation between general help seeking and unit test and final grade (Turner et al).

The two help-seeking styles are based on achievement-goal orientation. The two help-seeking styles are instrumental help seeking and expedient help seeking. The students in this study engaged in mastery-oriented activities, lessons, and directions supporting instrumental help-seeking orientation. Additionally, the treatment included daily reminders about how to seek appropriate help from formal and informal sources. The treatment can account for the positive correlations between instrumental help seeking and formal help seeking, informal help seeking as students were encouraged and supported in their help-seeking needs. As evidenced by Turner et al (2002), students who proactively seek help perform better in the classroom as evidenced by the positive correlations between instrumental help seeking and unit test and final grade. Ryan, Hicks, and Midgley (1997) concluded that grade point average and help-seeking avoidance were related negatively backing the negative correlation between instrumental

help seeking and help-seeking avoidance. Students who sought instrumental help from various sources were more successful.

Achievement goals influence help-seeking styles. Performance-oriented goals produce expedient help seekers, and mastery-oriented goals produce instrumental help seekers. The students in this study participated in mastery-oriented activities and lessons with directions supporting the instrumental help-seeking orientation rather than the expedient help-seeking orientation. Tanaka et al. (2002) found that students with performance-oriented goals and expedient help-seeking orientations had higher levels of help-seeking avoidance justifying the positive correlation between help-seeking threat and help-seeking avoidance.

Ability goals were positive predictors of help-seeking threat (Ryan et al., 1997). Ryan et al. found that when students displayed high levels of help-seeking threat, students avoided seeking help giving explanation to the correlation between threat and avoidance obtained in this study. Students avoided help because they were threatened by seeking help. Mastery-oriented educational practices can combat performance-oriented goals as indicated by Butler and Neuman (1995).

Achievement goals drive help-seeking attitudes, perceptions, and behaviors. Students preoccupied with perceptions of performance and outcomes display high levels of help-seeking avoidance (Karabenick, 1988, 2001, 2003; Karabenick & Knapp, 1991; Ryan et al., 1997). Because avoidant students fixate on performance and outcomes, avoidant students pass up seeking help from formal sources consumed by appearances and fears (Karabenick, 1998, 2003; Nelson-LeGall, 1985; Wolters et al., 2003) backing the negative correlation between help-seeking avoidance and formal help seeking.

Furthermore, avoidant students who do not obtain the necessary help will not perform as well as students who do seek help (Butler, 2008; Butler & Neuman, 1995; Moore, 2008; Nelson-LeGall, 1984; Ryan et al., 2005; Turner et al., 2002). Avoidant students had lower grades than students who were not as avoidant.

Although students who have instrumental help-seeking tendencies prefer to seek help from formal sources, help seekers incorporate all available resources, including informal sources (Karabenick & Knapp, 1991; Nelson-LeGall & Glor-Scheib, 1985). This study builds upon the previous research suggesting that help seekers know when to seek help (Butler, 2008; Butler & Neuman, 1995; Moore, 2008; Nelson-LeGall, 1984; Ryan et al., 2005; Turner et al., 2002) finding a positive correlation between informal help seeking and unit test and final grade. Students are able to detect deficits in learning; the decision students face is whether or not to seek the necessary help.

A strong positive correlation existed between unit test and final grade. This result is even more powerful when it is interpreted with the rest of the help-seeking literature and results obtained in this study. Students understand when they do not comprehend material help (Butler, 2008; Butler & Neuman, 1995; Moore, 2008; Nelson-LeGall, 1984; Ryan et al., 2005; Turner et al., 2002); however, teachers cannot force the students to seek the essential help. High-achieving students with an instrumental help-seeking style with low levels of help-seeking threat and help-seeking avoidance will be able to help themselves become more gifted learners with a skill that can be incorporated into any subject domain. Academic help seeking is a highly-strategic opportunity for students to become gifted and adept at applying into various learning situations.

This study provided results from a more diverse, younger group of students who were participating in only a science class. Previous literature (Karabenick, 2003) focused on older college students who have self-selected themselves into various college classes.

This section discussed the Pearson product-moment correlation coefficients from the posttest results. The next section presents a discussion on the classwork- and homework-checklist sheets.

Science Classwork- and Homework-Checklist Sheets

More total help-seeking bids were reported during class activities than during homework activities. Students reported making more informal help-seeking bids from peers and family members than from formal sources including teacher, textbook, and personal notebook. More technology requests for help occurred outside of the classroom because all students did not have access to the school's computer laboratory during class time.

The most self-reported help-seeking requests for classwork for all 123 students were made of peers and of the teacher, whereas the lowest self-reported help-seeking requests were made of the Internet and personal notebook. Because the students participated in a mastery-oriented learning environment, the students had many opportunities to seek help from teacher and peers. This result is consistent with Butler and Neuman (1995) and Butler (2008). These peer and teacher results are reasonable as peers are most readily available and easily accessible help-sources for students. It is surprising that students preferred to access their textbook rather than their collection of notes, worksheets, and resources contained in their personal notebook. The textbook can

be daunting and intimidating, especially to middle-school students. The teacher supported the students by helping students stay organized by using a personal notebook during daily lessons. No study to date had examined other sources of help besides formal and informal. This study attempted to gain insight into the other available sources that middle-school students may use during the school day.

The most self-reported help-seeking requests were made during homework activities of peers and family members, whereas the lowest self-reported help-seeking requests were made of the Internet and personal notebooks. Students preferred seeking help from informal sources at home. Perhaps this result occurred because the students perceived their families and peers in the same manner as their peers during class time not perceiving much threat (Karabenick, 2003) when seeking help from them (Butler, 2008; Butler & Neuman, 1995), because they still viewed the environment as mastery oriented. It is difficult to interpret the homework self-reported numbers because the students had to recall events from the previous evening and report them during class time and their recall may not have been accurate. Additionally, no observations were made of students in the home environment. There is no research in the help-seeking literature that examined help seeking in the home environment or examined the other sources of help that students may use in the home environment. Although these results must be interpreted carefully, this study did attempt to address the academic help-seeking needs of students in the home environment.

The previous section contained the discussion of the classwork- and homework-checklist sheets. The next section presents the implication for educational practice.

Implications for Educational Practice

Educators and school administrators are interested in increasing the results of the high-stakes testing by implementing a challenging curriculum, setting high standards for students, and by incorporating rigorous test preparation. Merely teaching students to become better test takers does not help them become better thinkers. Incorporating cognitive and metacognitive strategies into curriculum helps students become more adept thinkers and problem solvers. Ensuring educators understand about the delicate nature of help-seeking and the many factors that go into the reasons that students do and do not seek help when they do not understand curriculum is one way to combat this on-going middle-school school phenomenon that occurs in science classrooms. The results of the previous literature (Butler & Neuman, 1995; Ryan et al., 2005; Tanaka et al., 2002; Wolters et al., 2003) suggest that operating under performance-oriented goals allows students to develop stronger negative attitudes, perceptions, and behaviors toward help-seeking avoidance and help-seeking threat. Promoting a learning environment that supports mastery-oriented educational experiences (Butler & Neuman; Ryan et al.; Tanaka et al.; Wolters et al.) is one way to create a more positive help-seeking experience for all students and is crucial especially when attempting to cultivate life-long science learners with instrumental help-seeking tendencies. Valuing the learning process over the right answer to the problem or providing students with problems in which there is no one right concrete answer are two specific examples of ways to promote instrumental help seeking in students.

Furthermore, creating environments that allow students to be able to interact on their own without being admonished by the teacher is another way for students to develop

more positive views toward instrumental help seeking. Activities in which students sit quietly working on tasks by themselves has been shown to promote expedient help seeking in which students will often copy answers from each other (Butler 2008; Nelson-LeGall & Glor-Scheib, 1985). Teachers should desire to create an environment allowing students to talk and discuss answers among themselves allowing the students to maintain control of his or her own learning experience. In order to promote this discussion environment, students need to be trained not only to ask for help when necessary after exhausting all other resources but also to provide students with appropriate help when peers solicit help from them. Having students understand what is appropriate help does not include surrendering a paper over so that the peer can copy. Students must be provided guidelines on how to prevent expedient help seeking from occurring to them and for them. Appropriate help seeking looks like a dance in which one student asks a specific question about a subject and the other student responds providing enough information to assist the other student to be back on track or supplies a question to keep the conversation moving along. Information provided for students might include page numbers, definitions, or another question that the original student may be able to respond to successfully.

Because students rely heavily on their peers for support both in class and out of class, it is important for teachers to recognize that peers are important resources for students. Students need additional training that will allow them to work better with other students. Students will need to be able to provide sufficient help to peers to start them working successfully again without taking over or providing expedient help. Teachers will need to be taught how to help students assess their own understanding of the learning

situation possibly providing students with a script that will assist students to obtain the necessary aid when students detect learning deficiencies. Teachers also need to understand that their classroom rules and norms (Ryan et al., 2001) show students whether or not teachers value help seeking in the classroom environment. If students are only allowed to work quietly among themselves and not allowed to interact because the teacher believes that only expedient help seeking occurs during student interaction, then the students may develop higher levels of help-seeking threat and avoidance (Butler, 2008). Teachers must find ways of supporting these help-seeking support groups whether these groups are created by the teacher or informally with peers themselves.

Combining cognitive and metacognitive strategies with a rigorous science curriculum that promotes specific mastery-oriented environment benefits students by providing the students with a way to handle stressful academic situations that arise when students do not understand topics. Teaching students how to seek appropriate academic help (Newman, 1990) ensures that students receive the best possible long-term science education (Anderson, 2002) because students are empowered to go out and find the necessary assistance.

Grouping four homogeneous instrumental help seekers together benefited the instrumental help seekers. Because all four students shared the same achievement-goal values, students were able to support each other providing just enough assistance to get each other working again when help was needed maintaining autonomy (Butler, 1998). Additionally, expedient students using the Internet and textbook need to be supported and taught how to use these resources while regulating their own behavior. The expedient students in this study self-reported using the Internet and textbook but still had the lowest

grades and most expedient help seeking. Students must be supported cognitively and metacognitively in order to be successful life-long learning students.

This section contained the implications for education practice, and the next section contains the recommendations for future research.

Recommendations for Future Research

There are several areas that still need to be explored in the help-seeking attitudes, perceptions, and behaviors of students. Areas of future research include examining homogeneous-instrumental, homogeneous-expedient, and heterogeneous student-grouping interactions with follow-up interviews in class and at home; help-seeking attitudes, perceptions, and behaviors with small and large classes; the difference between student help-seeking attitudes, behaviors, and perceptions broken down by subject matter; and longitudinal data of help-seeking attitudes and perceptions.

Further study is needed to investigate the small-group interaction leading to the validation of the help-seeking measures providing specific and follow-up to the group-level observations. Follow-up interviews would allow researchers to gain more insight as to why students actually make the help-seeking choices that they do. Additional research should include observations of students during homework completion time. Moreover, further study needs to be completed examining the small-group interaction between instrumental and expedient help-seeking styles. Research is needed in the groups to investigate whether or not the homogeneous and heterogeneous help-seeking style groupings benefit student learning. Using a video tape recorder to record all possible observations and coding the behaviors should be implemented.

Second, small and large classes may play a role in achievement-goal perception and influence the help-seeking attitudes, perceptions, and behaviors of students. Previous research suggests that the large classes have students with higher performance-oriented values than smaller classes have (Karabenick, 2003). Smaller classes may benefit the student positively with regard to his or her help-seeking attitudes, perceptions, and behaviors, increasing instrumental help seeking, decreasing help-seeking avoidance, decreasing help-seeking threat, and increasing help from both formal and informal sources.

Third, students operate differently in different classes. Subject-matter differences may provide insightful information into the help-seeking attitudes, perceptions, and behaviors of students learning in different domains. In science, problem-solving creativity is valued. Students need to be able to approach various problems to look for solutions to the same problem. In mathematics, typically there is generally only one correct answer and one way to come to that particular solution. Help-seeking attitudes and perceptions of students in mathematics classes may produce different results from students who are enrolled in a science or language arts class in which creativity and problem solving are valued more than one right answer.

A longitudinal study is necessary to confirm whether or not help-seeking attitudes, perceptions, and behaviors can be changed for the long term. Because achievement goals develop over long periods of time and because it is possible to alter achievement goals over short-period interventions, help-seeking attitudes, perceptions, and behaviors can be altered as well over short periods of time; however, studies have not

been conducted investigating whether or not the help-seeking attitudes, perceptions, and behaviors persist over long term.

Help-seeking attitudes, perceptions, and behaviors may be limited to location and subject matter. Because help-seeking attitudes, perceptions, and behaviors are based on achievement-goal values, help-seeking attitudes, perceptions, and behaviors may depend upon more environmental factors including subject domain and subject matter. Students may adopt different levels of help-seeking attitudes, perceptions, and behaviors when they are placed into different learning environments.

Last, this study could be completed using a comparison group. A comparison group would allow researchers to better understand the implications of the treatment used in this study making for comparison from pretest to posttest for the help-seeking scales. A comparison group would aid in the examination of the student groupings providing stronger foundation for the comparison of student groupings.

This section contained the recommendations for future research. The next section summarizes the information that was presented in this final chapter.

Summary

The purpose of this study was to investigate how mastery-oriented inquiry-based education influences the help-seeking attitudes, perceptions, and behaviors of middle-school science students. Middle-school students completing mastery- and task-oriented inquiry-based activities fostered more instrumental help-seeking attitudes toward academic help seeking in the science classroom.

This study provided data suggesting that classroom practices and activities influence the help-seeking attitudes, perceptions, and behaviors of students. Examining

patterns of beliefs and attributions that students act upon during academic tasks and behavior (Covington, 2000) leads to achievement-goal orientation. Either students are attentive to developing, mastering, and improving tasks and activities in order to improve ability, or students are concerned with finishing and completing tasks in order to prove ability. When students value improving and learning in order to master and increase knowledge in a particular domain, they are referred to as mastery- or task-oriented students. When students prefer to prove ability or expediently finish tasks in a particular domain, they are referred to as relative-ability-, performance-, or ego-oriented (Skaalvik & Skaalvik, 2005) students.

When students seek help with aspirations to master, improve, or develop learning, they operate under mastery or task goals (Skaalvik & Skaalvik, 2005). The process of learning and developing understanding are ends in themselves. This proactive help-seeking phenomenon is known as adaptive help seeking. Adaptive (Tanaka et al., 2002) and autonomous (Aberbach, Lynch, & Eccles, 1991) help seekers strive to limit the amount of help that allows them to be able to solve problems on their own. Students desire help that consists of hints, similar examples, or further clarification (Tanaka et al.). Help seeking occurs at appropriate time points. Adaptive help seekers possessing mastery goals also display lower levels of help-seeking threat or anxiousness (Turner et al., 2002) during the help-seeking process, and they seek help from both formal and informal sources (Karabenick, 2003). As students develop mastery-oriented achievement goals, a desire for instrumental help seeking increases. Mastery-oriented classrooms lead to lower levels of help avoidance and lower levels of help-seeking threat.

Inquiry-based practices commonly used by science teachers allow students to guide themselves to operate under task goals while working with other students (Anderson, 2002; Eylon & Linn, 1988). One of these collaboration techniques that occurs in the classroom, whether sought from teachers or peers, is academic help seeking. Once positive attitudes toward academic help seeking exist, cycles of learning and help seeking may occur. When learners take the lead of their own learning, educators should find fewer examples of expedient help seeking (Karabenick, 2001, 2003; Newman, 1990, 2002).

The treatment over the 5-week intervention period appears to influence middle-school students' help-seeking attitudes and perceptions. An overall increase in general help seeking and instrumental help seeking occurred, and students perceived that they could incorporate general and instrumental help-seeking strategies into their study-skill set. An overall decrease in expedient help seeking, help-seeking threat, and help-seeking avoidance occurred, and students perceived that they were displaying lower levels of expedient help seeking, help-seeking threat, and help-seeking avoidance. An overall increase in both formal and informal help seeking occurred as well, and students perceived that could incorporate formal and informal help-seeking sources into their study-skill set.

Instrumental help seekers whether paired in homogeneous groupings or heterogeneous groupings tended to make more requests of someone else for assistance from either a peer or teacher, sought more help to learn to solve problems to find answers out by him or herself. Furthermore, instrumental help seekers make fewer attempts to obtain the needed answers quickly.

Correlation coefficients obtained from the help-seeking scales were similar to previous results obtained with older students (Karabenick, 2003). General help seeking is related to instrumental help seeking at both pre- and posttest moderately. General help seeking is related to help-seeking avoidance at pretest and posttest, respectively. General help seeking is related to formal help seeking from pretest to posttest, respectively. General help seeking is related to informal help seeking at posttest only. Instrumental help seeking is weakly and inversely related to expedient help seeking at pretest only. Instrumental help seeking is related to help-seeking avoidance at both pretest and posttest, related to formal help seeking moderately at both pretest and posttest, and is related to informal help seeking at posttest only. Expedient help seeking is related to help-seeking threat at both pretest and posttest and is related to help-seeking avoidance at both pretest and posttest. Expedient help seeking is related to informal help seeking at pretest only. Help-seeking threat is related to help-seeking avoidance at both pretest and posttest. Help-seeking avoidance is and related to formal help seeking negatively at both pretest and posttest. Formal help seeking is related to informal help seeking negatively at pretest only.

The results suggest that students who are placed in mastery-oriented learning environments in which mastery goals are emphasized tend not to avoid help (Ryan & Pintrich, 1997; Tanaka et al., 2002). Furthermore, classroom structure and help-seeking training and reminders allow students to interact seeking help from each other during classroom tasks and activities permitting students to ask more questions (Butler, 2008; Nelson-LeGall & Glor-Scheib, 1985). Student help is easier to obtain and more readily available in a classroom when students interact with each other (Newman & Goldin,

1990; Ryan & Pintrich, 1997). Providing students with academic strategies to use and apply immediately in the classroom environment equips students with a highly strategic plan and script to interact with (Nelson Le-Gall, 1990) allowing students no longer to rely predominantly on expedient help seeking strategies. Students appeared to use fewer expedient help seeking requests when placed in a mastery-oriented learning environment in which students progressed through laboratory activities in the science classroom focusing on the doing of science rather than the outcome of only a test, quiz, or grade. Students appeared to be able to make more direct nonexpedient requests indicating need for help from both peers and teacher. Help-seeking reminders may have provided students with a strategic academic strategy to implement in the classroom to make direct learning requests and values the help-seeking interaction.

The present findings suggest that eighth-grade science students perceived help seeking in different ways than their older counterparts. Perhaps these results occurred because eighth-grade students have yet to develop fully either strong help-seeking threat or help-seeking avoidance by the time that they are in middle school and students develop stronger connections with help-seeking threat and help-seeking avoidance as they progress through high school and college (Karabenick, 2003) and are enrolled in larger classes. Furthermore, middle-school students have yet to be tracked or self-selected (Karabenick, 2003) into science classes that promote performance-oriented achievement goals as opposed to a mastery-oriented achievement goals. Last, the smaller class size common to a middle school as opposed to being enrolled in a large class common to a college may impact how students perceive help seeking. Similar to their older counterparts, middle-school students demonstrated a preference for formal help

(Karabenick) probably showing a preference for help seeking from a formal source that yielded higher-quality information.

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APPENDIXES

Appendix A

Transcript Read to Students on First Day of Instruction

Appendix A
Transcript Read to Students on First Day of Instruction

Day 1

Still okay to turn in permission slips – I can still use them!
Letter to Students
Complete Surveys
Read Transcript

Transcript for Inquiry-Based Lessons

Not all middle-school students ask for help with school in the same way. One way that middle school students ask for help consists of asking for hints or clues to get them back on track so that they can solve problems on their own independently. This type of help allows students to apply what they learn in one situation and apply it to other situations, tasks, and tests.

This unit will include several lessons and last between 4 and 6 weeks. This unit contains lessons will include some activities, laboratory activities, graphing, and lectures. When you need help with something, remember that you can ask for appropriate help. You can ask for appropriate help from your peers or from your teachers.

What do you think appropriate help would look like in a science classroom?

What do you think inappropriate help looks like in a science classroom?

Appropriate help consists of asking for clues and hints to get you back on track so that you can solve problems on your own. Inappropriate help looks like cheating and copying.

You will be provided with reminders about what appropriate help looks like during this unit. If you have any questions, please ask either from a peer or a teacher.

You will be asked to provide information about your help seeking behavior during science class and during homework activities. I will discuss what I need you to do daily.

Appendix B

Classwork- and Homework-Checklist Sheet

Appendix B
Classwork- and Homework-Checklist Sheet

Student ID Number _____

HOMEWORK			CLASSWORK	
How many times did you ask for help from the following sources of help for your science HOMEWORK last night?			How many times did you ask for help from the following sources about the science lesson during the CLASS PERIOD today?	
Number	Source		Number	Source
	Peer			Peer
	Teacher			Teacher
	Personal Notebook			Personal Notebook
	Textbook			Textbook
	Internet			Internet
	Family Member			

Appendix C

Student-Teacher Observation Sheet

Appendix C
Student-Teacher Observation Sheet

		Scale	*Number of times observed behavior*	*Class activity*
1.	Asking someone for assistance.	Gen		
2.	Help sought to learn to solve problems and find answers by himself or herself.	Inst		
3.	Sought help in this class from another student.	Inf		
4.	Sought help to quickly get the answers needed.	Exped		
5.	Sought help in this class from the teacher.	Form		

Appendix D

Consent Letters Obtained from School Site Principal, Participating Student Teacher, and Parents of Participating Students

Appendix D
Letter of Permission from Principal of School Site

January 20, 2010

To the University of San Francisco Institutional Review Board (IRB):

I am familiar with Kimi Lynn Schmidt's research project entitled The Effects of an Inquiry-Based Educational Program on the Help Seeking of Middle-School Science Students. I understand involvement involves surveying students about their attitudes toward help seeking and use of their demographic and achievement data. Students will participate in a survey during two science class periods. The researcher will also collect student demographic and achievement data and observe student learning and interaction learning in Science classes.

I understand that this research will be carried out following sound ethical principles and that participant involvement in this research study is strictly voluntary and provides confidentiality of research data, as described in the protocol.

Therefore, as a representative of , I agree that Kimi Lynn Schmidt's research project may be conducted in our agency/institution.

Sincerely,

Appendix D
Letter of Permission from Participating Student Teacher

January 20, 2010

To the University of San Francisco Institutional Review Board (IRB):

I am familiar with Kimi Lynn Schmidt's research project entitled The Effects of an Inquiry-Based Educational Program on the Help Seeking of Middle-School Science Students. I understand involvement involves surveying students about their attitudes toward help seeking and use of their demographic and achievement data. Students will participate in two separate surveys during science class periods, which will take approximately 40 minutes each. Parents will give written consent for their student to participate.

I understand that this research will be carried out following sound ethical principles and that participant involvement in this research study is strictly voluntary and provides confidentiality of research data, as described in the protocol.

Therefore, as a student science teacher at whose mentor teacher and students will be used in this study, I acknowledge that Kimi Lynn Schmidt's study will be conducted in this eighth grade Science classroom.

Sincerely,

Appendix D
Letter of Permission from Parent for Achievement Goal Questionnaire
and Help-Seeking Scales

Date, 2010

Purpose and Background

Ms. Kimi Lynn Schmidt, doctoral student, of the Learning and Instruction department of the School of Education at the University of San Francisco is doing a study on eighth-grade science students' attitudes and perceptions of help seeking. My child is being asked to participate in a survey of help-seeking attitudes and perceptions because he or she is a student enrolled in an eighth-grade science class.

Procedures

If I agree to allow my child to be in this study, the following will happen:
1. Students will be given the option to participate or not.
2. My child will take a 19-item survey in his or her science classroom.
3. The survey should last approximately 25 minutes.
4. Students will be identified by identification number.
5. All the students in the class will be observed by the student teacher with regard to their help-seeking behavior.
6. Student checklists of the number of times your child sought help will be completed in class and at home.
5. The researcher will obtain achievement data including science unit grade, and final science grade.
7. Approximately four weeks later, students will re-take a 19-item survey in his or her science classroom.
8. The survey should last approximately 25 minutes.
9. The researcher will return results in a sealed envelope with interpretations upon completion of the study labeling students only by identification number.

Risks and/or Discomforts

1. My child may become uncomfortable or upset during the 25-minute survey; if this happens, the researchers will attempt to comfort my child. If my child continues to be upset, my child will no longer have to complete the survey.
2. Participation in research may mean a loss of confidentiality. Completed surveys and checklists will be kept as confidential as is possible. No individual identities will be used in any reports or publications resulting from the study. Study information will be coded and kept in locked files at all times. Only the researcher will have access to the completed surveys and checklists.

Benefits

There will be no direct benefit to me or to my child from participating in this study. My child will receive a standards-based education that follows the California Content

Standards for science that were adopted in 1998 by the California Department of Education. The anticipated benefit of this study is to assess if the educational unit that the students participate in affect attitudes and perceptions of middle-school help seeking. At the end of the study, results of the survey will be made available to the students along with interpretations of the data. Suggestions for improvement will be provided as well. Students, recognized by only their district identification number, will be provided with an envelope of information at the end of the study.

Costs/Financial Considerations
There will be no costs to me or to my child as a result of taking part in this study.

Payment/Reimbursement
Neither my child nor I will be reimbursed for participation in this study.

Questions
I have talked to Ms. Schmidt about this study and have had my questions answered. If I have further questions about the study, I may call her at .
If I have any questions or comments about participation in this study, I should first talk with the researcher. If for some reason I do not wish to do this, I may contact the IRBPHS, which is concerned with protection of volunteers in research projects. I may reach the IRBPHS office by calling (415) 422-6091 and leaving a voicemail message, by FAX at (415) 422-5528, by e-mailing IRBPHS@usfca.edu, or by writing to the: IRBPHS, Department of Counseling Psychology Education Building, University of San Francisco, 2130 Fulton Street, San Francisco, CA 94117-1080.

Consent
I will find two copies of this consent letter. Please keep one copy, sign, and return the other copy to your science teacher. PARTICIPATION IN RESEARCH IS VOLUNTARY. I am free to decline to have my child be in this study, or to withdraw my child from it at any point without penalty to my child's science grade. My decision as to whether or not to have my child participate in this study will have no influence on my child's present or future status as a science student at this middle school.

My signature below indicates that I AGREE to allow my child to participate in this study.

_____ _____
Signature of Student's Parent/Guardian Date of Signature

_____
Student ID Number

My signature below indicated that I DO NOT AGREE to allow my child to participate in this study.

_____ _____

Signature of Student's Parent/Guardian Date of Signature

_____ _____

Signature of Researcher Date of Signature

Appendix E

Cover Letter to Students for Pretest for Science Instruction Class Questionnaire

Appendix E
Cover Letter to Students for Pretest for Science Instruction Class Questionnaire

Date, 2010

Dear Student:

You are being asked to participate in a study of middle-school attitudes and perceptions of learning. I am a doctoral student enrolled in the Learning and Instruction department of the University of San Francisco and a science teacher. I would like to ask you for your help in the study. As part of this study, over the course of the semester, you will be asked to fill out two questionnaires related to your motivation and learning in your science class. In addition, I would like to collect information from you, your science unit test score, and your science grade. Your participation for this survey is voluntary and not related to your grade in this class.

You may decide to participate now but you can withdraw from the study at any time during the course of the semester with no penalty or impact on your grade. If you choose not to participate, then you will be provided with an alternate reading assignment to complete. All your responses are strictly confidential, and only the researcher will see your individual responses.

The attached questionnaire asks you about your study habits, your learning skills, and your motivation for work in this course. THERE ARE NO RIGHT OR WRONG ANSWERS TO THIS QUESTIONNAIRE. THIS IS NOT A TEST. I want you to respond to the questionnaire as accurately as possible, reflecting on your own attitudes and behaviors in this course. Your answers to this questionnaire will be analyzed by computer and you will only be identified by your identification number.

You may decide to participate now but you can withdraw from the study at any time during the course of the semester with no impact on your grade. If you participate in this study, you will receive an inquiry-based education that follows the California Content Standards for science that were adopted in 1998 by the California Department of Education. If you choose not to participate, then you will be provided with an alternate reading assignment to complete. All of your responses are strictly confidential and only the researcher will see your individual responses. If you choose not to complete the questionnaire, your science grade will not be affected. You will only be labeled by your identification number.

Please complete the attached questionnaire if you would like to be involved in this study. If you choose not to participate, I have provided an alternate reading assignment for you to read instead. Thank you for your help.

Sincerely,

Ms. Schmidt
University of San Francisco, Doctoral Candidate
Science Teacher,

Appendix F

Cover Letter to Students for Posttest for Science Instruction Class Questionnaire

Appendix F
Cover Letter to Students for Posttest for Science Instruction Class Questionnaire

Date, 2010

Dear Student:

You are participating in a study of middle-school attitudes and perceptions of learning. I would like to ask you for your participation in the study again. Approximately four weeks ago, I asked you to complete this questionnaire. I would like to ask you to complete another questionnaire related to your motivation and learning in your science class. In addition, I would like to collect information from your science unit score, and science grade. Your participation for this survey is voluntary and not related to your grade in this class.

You may decide to participate now but you can withdraw from the study at any time during the course of the semester with no impact on your grade. If you choose not to participate, then you will be provided with an alternate reading assignment to complete. All of your responses are strictly confidential and only the researcher will see your individual responses. If you choose not to participate, your science grade will not be affected. You will only be labeled by your identification number.

The attached questionnaire asks you about your attitudes and perceptions toward science learning and studying. THERE ARE NO RIGHT OR WRONG ANSWERS TO THIS QUESTIONNAIRE. THIS IS NOT A TEST. Please do not rush through the questions and feel free to take your time. I want you to respond to the questionnaire as accurately as possible, reflecting on your own attitudes and behaviors in this course. Your answers to this questionnaire will be analyzed by computer and I will not know anyone's name. You will only be identified by your identification number.

Thank you,

Ms. Schmidt
University of San Francisco, Doctoral Candidate
Science Teacher,

Appendix G

Student Information Sheet

Appendix G
Student Information Sheet

1. What is your student identification number? _____
2. Circle your gender.
   Male
   Female

3. What is your current age in years? _____

4. What is your ethnic background? Please circle only ONE response.

African American or Black
Asian American
Filipino American
Hispanic or Latino American
Pacific Islander
European American (not Hispanic)
Other

4. Do you participate in the free or reduced lunch program at this school site?
   Yes
   No

5. Approximately how many hours a week do you study for your science class? _____

Appendix H

Researcher's Student Information Sheet

Appendix H
Researcher's Student Information Sheet

1. Student Identification Number _____

2. Science Unit Test Score (Posttest only)_____

3. Science Grade at Conclusion of Inquiry-Based Unit (Conclusion of Unit) _____

Appendix I

Sample Lesson Plans Outline for Inquiry-Based Unit

Appendix I
Sample Lesson Plans Outline for Inquiry-Based Unit

Name _____ Date _____ Period 1 2 3 4 5 6

Standards

Announcements

IN
Answer the following questions completely. 1. How do you determine if something is in motion? 2. What is the formula to calculate average speed? 3. If you calculated the average speed of a runner in a marathon, would the runner be moving at that speed at every point in the race? Give a reason for your answer.

Determining Motion and Speed Lab

Directions: This is an interesting investigation which will let students learn how to conduct and perform scientific investigations, even difficult and challenging investigations. As students complete these investigations, they can learn how to do the necessary steps acquiring the necessary knowledge and how to improve as they perform different investigations. If you want, you can ask for help from either your teacher or a peer.

You need to walk to Mc Donald's after school on Wednesday to meet your friend. Mc Donald's is .27 miles away from the school. You need to know that 1 mile = 1.61 kilometers. Hint: How many meters are in a kilometer? In this investigation, you will design and use a plan to find the average speed of a pedestrian.

1. What are some controls that you need to have in place before you begin to do this laboratory activity?

2. What variables will you need to collect in this laboratory activity?

3. How do you think that you will organize this information?

Title: _____

Problem	
Materials	
Procedure	
Data/ Observations	
Results Questions	1. What patterns do you notice about the times from your data? 2. How long do you think that it will take your walker to actually get to Mc Donald's? 3. How accurate are your measured times? Is there a method that would provide more accurate results?

	4. Do you think that if the student walks to McDonald's that he or she will arrive there at that exact moment in time? Why or why not? 5. If you were going to repeat this investigation using a student on a skateboard, would you be more likely to get accurate results with a longer course or a shorter course? Give a reason for your answer.

OUT	
Conclusion	Use the space below to write your ReC^{2}ALL.

Name _____ Date _____ Period 1 2 3 4 5 6 ITO# _____

<u>DIRECTIONS</u>: Crumple up one piece of paper and leave the other paper flat.

What is the mass of the crumpled paper? _____ What is the mass of the flat paper? _____

Predict what you think will happen when you drop both the crumpled paper and the flat paper at the same time from the same height…

What actually happened?

What forces are involved?

Draw the forces that are acting on the objects.

<u>DIRECTIONS</u>: Release two round objects at the same time from the same height.

What is the mass of the first round object? _____
What is the mass of the second round object? _____

Predict what you think will happen when you release the two round objects at the same time from the same height.

What actually happened?

What forces are involved?

Draw the forces that are acting on the objects.

<u>DIRECTIONS</u>: Create an experiment showing Newton's <u>ENTIRE</u> First Law of Motion.

What forces cause the movement to occur?

What forces cause the movement to stop?

Name _____ Date _____ Period 1 2 3 4 5 6

Standards

Announcements

IN
Answer the following questions completely. 1. If a student ran an obstacle course that had a distance of 20 meters four times and the four times took 17 seconds, 19 seconds, 16 seconds, and 21 seconds, calculate the average speed for the student? Show your work.

THROUGH
Stopping on a Dime Lab Directions: This is an interesting investigation which will let students learn how to conduct and perform scientific investigations, even difficult and challenging investigations. As students complete these investigations, they can learn how to do the necessary steps acquiring the necessary knowledge and how to improve as they perform different investigations. If you want, you can ask for help from either your teacher or a peer. Rancho needs a new gym. Over the past few years the staff has noticed a lot more injuries that have occurred in the gym when students run into the wall during basketball and volleyball games. Your job is to figure out how much distance and space are needed so that a student running full speed at the end of the court has enough time to stop safely. 1. What are the controls for this investigation that you need to worry about? 2. What are the variables that will be used in this investigation?

TITLE: _____

Problem	
Materials	
Procedure	
Data/Observations	

Results Questions	1. What patterns do you notice about the times from your data? 2. How accurate are your measured results? Is there a method that would provide more accurate results? 3. How far away does the wall need to be from the students so that the students can slow down safely? Justify your answer. 4. If a standard volleyball court needs to be 9m x 18m, how big does the gym need to be to stop safely? Show your work. 5. If a standard basketball court needs to be 28.65m x 15.24m, how big does the gym need to be to stop safely? Show your work.

OUT
Instead of writing a conclusion, you are going to write a proposal to the school district that describes the problem that we are having at school. In your proposal, suggest strategies for making the court safer.

Name _____ Date _____ Period 1 2 3 4 5 6

Standards

Announcements

IN

Answer the following questions completely.

1. What is acceleration?

2. What is the difference between speed and acceleration?

3. What is the unit for force?

4. If you selected a Newton for answer number 3, what does a N represent?

5. What is the difference between force and acceleration?

THROUGH

May the Force be with You Lab

Directions: This is an interesting investigation which will let students learn how to conduct and perform scientific investigations, even difficult and challenging investigations. As students complete these investigations, they can learn how to do the necessary steps acquiring the necessary knowledge and how to improve as they perform different investigations. If you want, you can ask for help from either your teacher or a peer.

Before cars are released to the public, the cars undergo several tests. These tests include safety tests and handling tests. Normally cars are on a racetrack when they are tested for how fast they accelerate. Since you are too young to drive and the classroom is only so big, we will simulate a 1-meter racetrack within the classroom.

1. What are the controls for this investigation that you need to worry about?

2. What are the variables that will be used in this investigation?

TITLE: _____

Problem	
Materials	
Procedure	1. Using masking tape park off a one-meter distance on the follow. Label one end "start" and one end "finish." 2. Attach a loop of string to the scooter. Place a mass on the scooter. Record your mass here _____. 3. Attach a spring scale to the loop of string. Pull the scooter so that you maintain a force of 2.0N. Be sure to pull with the scale straight out in front. Practice applying a steady force to the scooter as it moves. 4. Find the smallest force needed to pull the skateboard at a slow, constant speed. Do not accelerate. Record this force on the first line of the table. 5. Add mass to the force in Step 4. How much mass did you add? _____ Record this force on the second line of the table. 6. Have one partner hold the scooter at the start line. Then GENTLY pull the spring scale with the force your found in Step 5. 7. When your partner says "go" and releases the skateboard, maintain a constant force until the skateboard reaches the finish line. Start timing at this point. Record the time in the column labeled T-1. 8. Repeat Steps 6 and 7 recording your data in columns T-2 and T-3. 9. Repeat steps 6, 7, and 8 using a force that is 1.0N greater than the force your found is step 6. Record your data in the table. 10. Repeat steps 6, 7, and 8 using forces that are 1.5 N and 2.0 N greater than the force you found in step 6.

Data/Observations

Force (N)	T-1 Time (s)	T-2 Time (s)	T-3 Time (s)	Averag Time (s)	Averag Speed (m/s)	Final Speed (m/s)	Acceler ation (m/s2)

Results Questions

1. Finish completing the chart by calculating average time, speed, final speed (multiply each average speed by 2), and acceleration for each force (divide each final speed by average time).

2. What patterns do you notice about the times from your data?

3. How accurate are your measured results? Is there a method that would provide more accurate results?

4. Make a line graph of Force and acceleration in the space below.

5. If acceleration is zero, what is the net force on the scooter? Explain your answer.

6. According to your graph in question 4, how is the acceleration of the scooter related to the pulling force?

OUT
Instead of writing a conclusion, design an experiment to test how the acceleration of the loaded skateboard depends on its mass. Think about how you would vary the mass of the skateboard. What quantity would you need to measure that you did not measure in this experiment? What quantity would you need to keep constant or the same? What other materials would you need to do this investigation?

Name _____ Date _____ Period 1 2 3 4 5 6

Standards

Announcements

IN
Answer the following questions completely. 1. What makes a roller coaster fun for you, or not so much fun? Be specific. 2. What are some observations that you have made about roller coasters? Think about the drops, loops, and speed…

THROUGH
Roller Coasters At its most basic level a roller coaster is a machine that uses **gravity** and **inertia** to send a train along a winding track. The purpose of the coaster's (car) initial climb is to build up a sort of reservoir of **potential energy**. The concept of **potential energy** is very simple: As the coaster car gets higher in the air, gravity can pull it down a greater distance. The potential energy you build going up the hill can be released as **kinetic energy** -- the energy of motion that takes you down the hill. Once you start cruising down the hill, **gravity** takes over and all the built-up potential energy changes to kinetic energy. Gravity applies a constant downward force on the cars. Since an object in **motion** tends to stay in motion (**Newton's first law of motion**), the coaster car will maintain a forward **velocity** even when it is moving up the track, opposite the force of gravity. When the coaster ascends the hills that follow the initial lift hill, its **kinetic energy** changes back to **potential energy**. In this way, the course of the track is constantly converting **energy** from kinetic to potential and back again (change in acceleration). This fluctuation in **acceleration** is what makes roller coasters so much fun. In most roller coasters, the hills decrease in height as you move along the track. This is necessary because the total energy reservoir built up in the lift hill is gradually lost to **friction** between the train and the track, as well as between the train and the air. When the train coasts to the end of the track, the energy reservoir is almost completely empty. At this point, the train either comes to a stop or is sent up the lift hill for another ride.

1. What is the role of Potential and Kinetic Energy in roller coasters?

2. What is the role of Gravity?

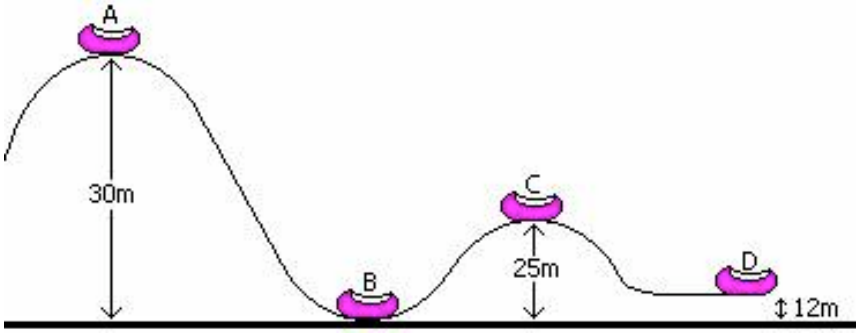
3. How does acceleration make the roller coaster ride so much fun? How/when does change in acceleration occur on a roller coaster?

4. What is friction? How does it apply to roller coaster rides?

We will take a look at a demo that will show us how roller coasters work (potential and kinetic energy).
How roller coaster works
Fill in the blanks:

At the top of the first lift hill (a), there is maximum _____ because the train is as high as it gets. As the train starts down the hill, this potential energy is converted into _____ -- the train speeds up. At the bottom of the hill (b), there is maximum _____ and little potential energy. The _____ propels the train up the second hill (c), building up the potential-energy level. As the train enters the loop-the-loop (d), it has a lot of _____ and not much _____ . The _____ level builds as the train speeds to the top of the loop (e), but it is soon converted back to kinetic energy as the train leaves the loop.

Look at the diagram below and answer prompts that follow:



Fill in the table below for **EACH** point (A, B, C, D) determine:

- PE (state if high or low)
- KE (state if high or low)
- Gravitational Force (show direction of the force)
- Acceleration
- Velocity
- Distance (indicate distance covered between points A-B, B-C, C-D)
- Motion of the cart.

	A	B	C	D
PE (state if high or low)				
KE (state if high or low)				
Gravitational Force				
Acceleration				
Velocity				
Distance				
Motion of the cart.				

Directions: This is an interesting investigation which will let students learn how to conduct and perform scientific investigations, even difficult and challenging investigations. As students complete these investigations, they can learn how to do the necessary steps acquiring the necessary knowledge and how to improve as they perform different investigations. If you want, you can ask for help from either your teacher or a peer.

Draw the set up of your roller coaster.

- Why isn't the marble moving? How do you think we could get it to move?
- Why does the marble start to accelerate or go faster?
- Why did the marble stop?
- If allowed to run off the track, why would the marble stop?
- What physics concepts have been applied/presented to you during this demonstration?

1. What are the controls for this investigation that you need to worry about?

2. What are the variables that will be used in this investigation?

Your challenge is to design a roller coaster for a marble to travel on (without falling off) with at least one vertical loop!

You will be given a 3-foot isolation pipe, masking tape and a marble.

Here are some criteria that must be met:

- Marble must complete the course while staying on the track
- You may not use human force to get your marble started on the track
- You need to have one complete vertical loop
- Each group member must participate in the design, construction and operation of roller coaster.
- You may use the room walls, tables, and floors to create your design using the pipe insulation and masking tape to connect it together.

TODAY'S ACTIVITY:

- Before actually building a roller coaster, groups need to turn in **a design/drawing** of their roller coaster.
- Each paper should contain following information. (use both sides if needed)
    - **Roles for each member of the group:** Each group member will take on one of the following roles: designer, engineer, and inventor. If there are four in your group, two should take on one of these roles together.
    - **Drawing:** The **designer** will be responsible for drawing diagrams of different parts of roller coasters and the names of each. Write down these parts that you will need to draw: Starting point, small/large loop, large camel back, and small camel back, ending point.
    - **Definitions:** The **engineer** will be responsible for defining words that are important in understanding how roller coasters work. Write down these terms you will need to define: acceleration, centripetal force, energy, force, friction, momentum, potential energy, speed, and velocity.
    - **Physics behind the roller coaster:** The **inventor** will be responsible for writing about how roller coasters work and what makes them go. They will need to tell about potential and kinetic energy, velocity, acceleration, centripetal force, etc.

Each team will be given a piece of paper for their drawings. At the end of this period you should have these three items ready to be turned in to the teacher:

1. Design
2. Definitions of physics terms

3. Explanation of how your roller coaster will work, and what will make the marble move down the roller coaster.

Here are the criteria that we want to meet:

- Marble must complete the course while staying on the track
- You may not use human force to get your marble started on the track
- You need to have one complete **vertical loop**
- **Explanation of the physics concepts at work in your roller coaster ride.**

Materials that will be provided:

- One glass marble
- Masking tape
- ~3 foot piece of foam pipe (you'll need to cut it length wise)
- Your team's roller coaster design.
- Post-its/labels, to explain the physical concepts at work in your roller coaster ride.

Once you have constructed your roller coaster with one full vertical loop, test the marble on it. The marble must go the whole distance of the roller coaster, without falling off. Test the run at least 3 times.

If the first run is not successful, make necessary changes, and record them in a table provided below.

Record of Roller Coaster Changes

Describe Change to Roller coaster	Draw Change	Predicted outcome	Actual Outcome

Please remember to only change one variable at a time and record the outcome

Your teacher must sign off on your design before you are allowed to start building (you need ALL 3 pieces from yesterday completed, drawing/definitions/how it works)

Teacher Signature_____

- Using the room walls, tables, and floors, create your design using the pipe insulation and masking tape to connect it together. **The engineer and inventor should work together on creating post-its/labels, to explain the physical concepts at work in your roller coaster ride.**

Appendix J

Lesson Plan Outline for Inquiry-Based Unit broken down by Type of Activity and California State Science Content Standards for Grade 8

Appendix J
Standards-Based Education and Inquiry-Based Education 4-Week Program

Week	Day	Inquiry-Based Program	Type of Activity (Individual-Group-Class Discussion Activity Type)	California Science Content Standards Addressed	
1					
	1	Science Class Questionnaire Pretest	Instrument (Individual)		N/A
	2	Pre Assessment / Post Assessment	Assessment (Individual-Group-Class Discussion)	1,2	Mastery
	3*	Vocabulary Introduction - Force, velocity, acceleration, speed, distance, time	Worksheet (Individual-Group)	1,2	Mastery
	4	Motion Inquiry Lab, Frame of Reference, Speed	Inquiry Activity (Group)	1a, 1b, 1c, 1d, 1e	Mastery
	5	Motion Inquiry Lab Continued, Frame of Reference, Art of Measuring Speed WS	Inquiry Activity (Group)	1a, 1b, 1c, 1d, 1e	Mastery
2					
	1	Graphs – position vs. time Graphs – speed vs. time for motion	Direct Instruction & Worksheet (Individual-Group)	1f	Teacher Directed
	2	Newton's First Law Law of Conservation of Momentum	Inquiry Activity (Group)	2a, 2b, 2c	Mastery
	3*	Newton's First Law Inquiry Lab	Inquiry Activity (Group)		Mastery
	4	Newton's First Law Inquiry Lab Continued	Inquiry Activity (Group)	2a, 2b, 2c	Mastery
	5	Newton's Second Law F=Mass x Acceleration WS Quiz	Worksheet (Individual-Group)	2a, 2b, 2c	Teacher Directed
3					

	1	Newton's Second Law Inquiry Lab	Inquiry Activity (Group)	2a, 2b, 2c	Mastery
	2	Newton's Second Law Inquiry Lab Continued	Inquiry Activity (Group)	2a, 2b, 2c	Mastery
	3*	Newton's Third Law Forces	Direct Instruction (Individual)	2a, 2b, 2c, 2f	Mastery
	4	Newton's Third Law Inquiry Lab	Inquiry Activity (Group)	2a, 2b, 2c, 2f	Mastery
	5	Newton's Third Law Inquiry Lab Continued	Inquiry Activity (Group)	2a, 2b, 2c, 2f	Mastery
4					
	1	Acceleration; Forces and Acceleration WS	Worksheet (Individual-Group)	2e, 2f	Teacher Directed
	2	Quiz; Gravity, Tension, Compression, Friction WS	Assessment (Individual) & Worksheet (Group)	2d, 2g	Teacher Directed
	3*	Complete Review WS for Test	Assessment (Individual)	1, 2	Teacher Directed
	4	Review Answers from WS	Assessment (Individual)	1,2	Teacher Directed
	5	Unit Posttest	Assessment (Individual)		Teacher Directed
5					
	1	Science Class Questionnaire Posttest	Instrument (Individual)		Teacher Directed

* Minimum Day Period is 40 minutes long. All other class periods are 50 minutes long.