Visualizing the menstrual cycle: effects of a redesigned cycle diagram on community college biology students' learning

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A Dissertation

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
In partial fulfillment of the
Requirements for the degree of
Doctor of Philosophy

in

The Department of Educational Theory, Policy and Practice

by

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francescabdallalwaysomethinggreattogether
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# TABLE OF CONTENTS

ACKNOWLEDGEMENTS ................................................................................. iv  
LIST OF TABLES ......................................................................................... ix 
LIST OF FIGURES ......................................................................................... x  
ABSTRACT ....................................................................................................... xi  

**CHAPTER 1, INTRODUCTION** ................................................................. 1  
  Rationale........................................................................................................ 1  
  Research Questions...................................................................................... 6  
    Main Question............................................................................................. 6  
    Subquestions.............................................................................................. 6  
  Definition of Terms..................................................................................... 10  

**CHAPTER 2, LITERATURE REVIEW** ......................................................... 12  
  Tufte’s Theory of Design............................................................................ 12  
  Memory and Learning................................................................................. 17  
  Community College and Its Students...................................................... 19  
  Sexuality Education................................................................................... 20  
  The Media and Sex Education................................................................ 28  
  Hormonal Control of the Female Reproductive Cycle.......................... 34  
  The History of Contraception................................................................. 36  
  Menstrual Cycle Representation.............................................................. 41  
  Research Methodology.............................................................................. 43  

**CHAPTER 3, METHODS** ......................................................................... 47  
  Research Design.......................................................................................... 47  
  Research Site............................................................................................... 47  
  Research Participants................................................................................ 48  
  Data Collection............................................................................................ 48  
  Interviews.................................................................................................... 49  
  Menstrual Cycle Knowledge Survey....................................................... 49  
  Protection of Human Subjects................................................................. 49  
  Data Analysis............................................................................................... 49  
  Limitations.................................................................................................. 51  
  Menstrual Cycle Diagram Study............................................................... 51  

**CHAPTER 4, RESULTS AND DISCUSSION** .......................................... 53  
  Survey Results............................................................................................ 53  
    Item Analysis............................................................................................ 53  
    Category Comparison............................................................................. 68  
  Interview Results....................................................................................... 72  
  Student Profiles......................................................................................... 72  

LIST OF TABLES

Table 1. Summary of Menstrual Cycle Diagram Classification ..............................43
Table 2. Percentage Comparison of Pretest and Posttest Answers .........................65
Table 3. Pearson’s Chi Square Analysis of Questions 18-41 .................................66
LIST OF FIGURES

Figure 1. The Menstrual Cycle Diagram with ovulation highlighted. .........................4
Figure 2. Gowin’s Research Vee Diagram .............................................................8
Figure 3. Flow Chart of Research.................................................................9
ABSTRACT

This mixed methods, exploratory study investigated the importance of the menstrual cycle diagram for understanding human reproduction. Several theories were used to support this study including Visual Design Theory (Tufte, 1990, 1997, 2001), and Human Constructivist Theory (Mintzes, Wandersee, Novak 1998). The two sexuality education programs used by society, abstinence-only programs and comprehensive sex education programs were compared to illustrate how this study applies to the current state of sexuality education in the United States. Community college students from two institutions in the southern region of the United States, registered in five introductory biological science courses, participated in a unit on the menstrual cycle diagram. These students were given a pretest and posttest probing their knowledge about the menstrual cycle and the value added by using a menstrual cycle diagram during instruction. The main diagram that was tested used a calendar format diagram designed by the researcher. After the posttest was administered, six students from each course were clinically interviewed. A partitioned content analysis was performed on the qualitative data with respect to student understanding and variables--gender, age category, prior knowledge, childbearing experience and geographic area. Pearson’s chi-square analysis was used on the quantitative data to determine if there was a statistically significant difference between the answers for each question on the pretest and posttest. In addition, a paired t-test was performed on the quantitative data to determine if there was a statistically significant difference between the pretest and posttest scores of the students who participated in the study, overall and by category. Nine of the 23 questions showed a
statistical significant difference between the pretest and posttest. On six of those nine questions the students’ knowledge increased as a result of the presentation. The areas of the menstrual cycle where knowledge was gained included: menses/menstruation, ovulation, menopause, hormonal control, and life span of sperm. During the interviews, students indicated there was value added to their understanding of the menstrual cycle with the use of the content-equivalent, calendar-format menstrual cycle diagram. The value added was directly related to the symbols used to represent the events of the menstrual cycle.
CHAPTER 1

INTRODUCTION

Rationale

Sex education is taught in most public schools around the United States. The content of sex education varies based on the degree of concentration on abstinence and effectiveness of contraceptives and is dependent on the teachers, parents, school districts and funding in that locale. With such variable information being presented, there is concern that young women do not understand the changes in their bodies and do not realize that understanding the menstrual cycle allows them to prevent unwanted pregnancies. The lack of accurate and comprehensive information about the menstrual cycle prevents persons from making informed decisions about reproductive issues such as contraception and safe and effective treatments for menstrual disorders (Koff, Rierdan & Stubbs, 1990). It is vital to promoting a healthy reproductive lifestyle that this information is presented. The goal of this research was similar to that of basic health communication which is to increase the intended audience’s knowledge and awareness of a health issue, problem or solution, to influence perceptions, beliefs and attitudes that may change social norms and to refute myths or misconceptions (Freimuth & Quinn, 2004).

The ability of students to make connections while learning is critical in the science learning process. This method of learning is termed “meaningful learning” (Langer 1997). With meaningful learning, there are two ways to link the concepts to the real world. First, the instructor must present the ideas using an approach that relates to
their lives, interests and curiosities. The second challenge is to change their attitudes about science and show how meaningful science is to their lives (Langer 1997).

Since the early discovery of science, scientists have used pictures to illustrate anatomy, mechanisms, and processes. In the literature, it has been proven that observation is an important source of knowledge in biology (Manuel, 1986). This is evident by reading any type of scientific writing—textbooks or articles. A good illustration, as defined by Mayer and Gallini (1990), promotes the reader’s understanding of how a scientific system works—an explanatory illustration. In addition to helping with the text that is presented, illustrations may also add information that is not in the text or compensate for deficiencies in the text (Iding, 2000). The illustration provides a graphic representation of the text.

Good illustrations are what is needed throughout the scientific community but are not always developed. Incorrect or poor illustrations often lead to misconceptions and/or prohibit the student from establishing meaningful connections. This latter defect is supported Yip (1998) who found that students were able to answer questions correctly about the menstrual cycle but had no reason for their answers. In addition, the use of poor quality materials contributes to the biases of information about cyclicity (Erchull, Chrisler, Gorman, & Johnston-Robeldo, 2002). The information that is developed about the menstrual cycle appears in textbooks, and in educational and marketing materials. In order to dispel misconceptions, Koff, Rierdan and Stubbs (1990) agree that a better understanding of the scope of women’s knowledge and beliefs about various aspects of the menstrual cycle could suggest useful directions for interventions by educators and health care providers.
The purpose of this research project was to enhance the scientific understanding of the menstrual cycle in community college biology students by using illustrations. First, to enhance a diagram one must understand the problems that are present. In the summer of 2004, I enrolled into an undergraduate course entitled Human Sexuality. As a graduate student, I believed that college students would have some basic knowledge about not only how pregnancy occurs but when it actually occurs in the menstrual cycle. However, I learned that students are unaware what the term “ovulation” means in terms of pregnancy and the menstrual cycle. I learned this in class when the instructor asked various questions about ovulation and pregnancy and the students were not able to answer her questions. This baffled me—that college students did not understand the basics of reproduction. After a survey by the instructor of the Human Sexuality course, it was apparent that students were not grasping the details of when pregnancy can actually occur during their sex education courses. The fall semester after this course is when I began to investigate the menstrual cycle diagram and, later, to design the diagram that will be used with the research that will be described in detail later.

After viewing many different diagrams and considering what took place in the Human Sexuality course that summer, I realized the problem. Students could not identify the fertile days nor did they know when to use a method of contraception to prevent pregnancy. In several menstrual diagrams, ovulation is labeled but the significance of this event in the menstrual cycle is not made clear. For example, in the diagram that follows (see Figure 1), the Menstrual Cycle (Ovulation, 2005), there is some missing accompanying text along with the diagram that should explain the terms—ovulation, FSH, LH, Estradiol, Luteal Phase. Both Edward Tufte (1997, 1999, 2001) and Francis
Dwyer (1978) are information design experts who claim that a diagram should be able to stand alone and should be intellectually equivalent to accompanying caption text. In this case, there is no indication of what ovulation means to the student who is trying to prevent pregnancy.

![Figure 1. The Menstrual Cycle with ovulation highlighted.](image)

The box around ovulation signifies the area of confusion or misinterpretation by the student. Students are not told that this green box signifies the most fertile days in a woman’s menstrual cycle. The days inside the box, fertile days, are the days that are important to pregnancy actually occurring or not occurring (Gravelle, Casto, N. & Casto, C., 1998; Harris & Emberley, 2004; Strong, Sayad, DeVault, & Yarber, 2005; Weschler, 2002). This information about the fertile days, as well as “contraceptive alert” days, are just as important to the single college student and the married couple trying to get pregnant because this time period is when the woman is most likely to be able to conceive. This time in the woman’s cycle is when the endometrial lining is preparing for
implantation, ovulation is about to occur, and if viable sperm are present inside the female tract, they may be able to fertilize egg that has been released.

In addition to a lack of understanding, there are also many misconceptions about the menstrual cycle that impact students’ thinking and decision making. For example, a student in one of my biology laboratory courses argued that a woman can get pregnant any day of the month and there was no such thing as a fertile period. However, it had to be shown to the student that there is documented evidence that a woman gets pregnant around the time of ovulation and that ovulation only occurs at a certain time in the menstrual cycle. Ruth and Steph Chambers (2001) mention that incorrect information circulates through the peer groups and they tend to believe that information; unfortunately, too few young people have access to the correct information. Therefore, one long-term goal of this research was to impact the sex education curriculum by teaching students to understand the optimal days that fertilization may occur (when pregnancy is most likely and possibly, how to prevent its occurrence) and the effects of different contraceptive methods. It is important the correct information is accessible to students at all age levels to help dispel the myths that spread through their peer groups. The ultimate goal is to create mindful learners who are able to apply science concepts to their daily lives.

The study attempted to directly address the learning of the menstrual cycle diagram. The study investigated the conceptual changes that take place as students learn about the menstrual cycle. A new style of the menstrual cycle diagram that was designed by the researcher in calendar format was used as one of the diagrams presented. (See Appendix A). It also examined the effectiveness of the Menstrual Cycle Knowledge
Survey (see Appendix C), an instrument developed by the researcher to determine if students were able to apply the events that occur throughout the menstrual cycle.

Research Questions

Main Question

How do modifications of the menstrual cycle diagram influence selected community college students’ scientific understanding of human reproduction?

Subquestions

1. What difference in scientific understanding results from studying human reproduction with a layered-linear type menstrual cycle diagram, as opposed to a content-equivalent calendar type menstrual cycle diagram?

2. Which graphic design, given the variety that exists for each of the two diagram types, appears to be optimal for maximizing scientific understanding and the ability to use scientific information personally?

Research Vee Diagram

To graphically illustrate and summarize the research for the menstrual cycle diagram, a Vee Diagram was constructed (Gowin, 1981). The research question is located at the top of the Vee and the subquestions are located within the Vee. Theories, principles and concepts that will be used in the research are listed on the left side. The events that will occur during the research are listed below the Vee. The value claims and knowledge claims that are listed have been obtained from students in several courses taught by the researcher, and are located along with the transformations and records on
the right side of the Vee. Note also, this research project’s flow chart (see Figure 2), and
the lexicon of research terms that follow.
Research Question
How do modifications of the menstrual cycle diagram influence selected college students' scientific understanding of human reproduction?

Subquestions
1. What difference in scientific understanding results from studying human reproduction with a layered-linear type menstrual cycle diagram, as opposed to a content-equivalent calendar type menstrual cycle diagram?
2. Which graphic design, given the variety that exists for each of the two diagram types, appears to be optimal for maximizing scientific understanding and ability to use scientific information personally?

THEORY
Meaningful Learning
Tufte's Theory of Graphic Design

PRINCIPLES
Meaningful learning involves use of prior knowledge and connection to new concepts.
Graphical excellence is attained by using simple but powerful graphic design.

CONCEPTS
Menstrual cycle, menstruation, fertile period, ovulation, fertilization, hormone production, intercourse, sperm, oocyte/egg, pregnancy prevention, sexual intercourse, and contraception

EVENTS/OBJECTS
Create Menstrual Cycle Calendar
Calendar Presentation
Calendar Knowledge Testing
Interviews
Calendar Survey

RECORDS
Knowledge Testing Results
Audiotapes of student interviews
Surveys

TRANSFORMATIONS
Transcription and analysis of audiotapes
Descriptive and statistical analysis of surveys
Descriptive and statistical analysis of knowledge testing

KNOWLEDGE CLAIMS
Knowledge of the menstrual cycle is critical to sex education more specifically pregnancy prevention.

VALUE CLAIMS
Instruction which emphasizes meaningful and visual learning lead to increased student understanding of the menstrual cycle.
Develop research questions using two types of menstrual diagrams, linear and circular & begin literature review Summer 2004

Design menstrual cycle calendar Fall 2004

Begin using calendar format in courses to determine any errors Spring 2005

Preparation of prospectus Spring-Summer 2006

Research Study Spring 2007

Presentation & Approval of Prospectus Early Spring 2007

Pretest Menstrual Cycle Knowledge Survey

Menstrual Cycle Calendar Presentation

Posttest & Interviews

Menstrual Cycle Linear Format Presentation

Posttest & Interviews

Data Analysis Late Spring 2007

Figure 3. Flow Chart of Research.
Definition of Terms

Abstinence-only programs--promote abstinence exclusively and explicitly and exclude advocating contraceptives except to stress failure rate.

Abstinence plus programs--See Comprehensive sex education

Calendar--a system showing time by days, months, weeks, years; usually a chronological list or schedule.

Comprehensive sex education--teaches abstinence and also provides necessary information on contraceptives, unwanted pregnancy prevention, sexually transmitted infection prevention, and reduction in number of sexual partners.

Diagram--plan, sketch, drawing or outline designed to explain, demonstrate, or clarify the relationship among parts of a whole or to illustrate how something works.

Meaningful learning--the activation of prior knowledge related to any new information, and the association of the new knowledge to relevant prior knowledge.

Menstrual cycle--recurring cycle of change in the endometrium during which the endometrial tissue is shed, then regrows, proliferates, is maintained for several days and is shed again at menstruation; a monthly event in the lives of women from puberty through menopause.

Sexuality education--(according to Louisiana law, R.S. 17:281, 1993) the dissemination of factual biological or pathological information that is related to the human reproduction system and may include the study of sexually transmitted disease, pregnancy, childbirth, puberty, menstruation, and menopause as well as the dissemination of factual information about parental responsibilities under the child support laws of the state.
Sexually transmitted infection (STI)--sometimes referred to as STD but STI chosen because person can be infected with organism but not have illnesses or disease.

There are 25 infectious organisms that can be passed from person to person primarily through sexual contact.

Vee diagram--a diagram which graphically illustrates the questions, events, methods, and theoretical and conceptual foundation of a research study.
Tufte’s Theory of Design

According to Edward Tufte, a graphic should be as sophisticated as the text that it accompanies. There are three volumes to his graphic design series that will guide the redesign of the menstrual cycle diagram. The three volumes are as follows: *Visual Display of Quantitative Information* (2001), *Envisioning Information* (1990) and *Visual Explanations* (1997). Each volume has a specific theme which is directly related to the graphics that are displayed in the text.

In volume 1, *Visual Display of Quantitative Information* (2001) the goal is to present pictures of numbers; such items as histograms, box plots, charts, and tables are used to show the graphic designer how to maximize data ink. The first principle in this volume is above all else show the data (Tufte, 2001). Tufte states that the designer should pay close attention to the substance of the data and nothing else. He implies that nothing else is important but the data, not even the decorations that may accompany the data. Tufte (2001) suggest to maximize data ink within reason. He suggests using the space provided effectively without cluttering the data to present the best graphic representation possible.

Erasing data ink has two components, erase data ink not in use and reduce data ink. Data ink that can be erased does not add any substance to the graphic. For example when redundant data ink is reduced it does not cause the graphic to be incoherent. Tufte uses the example of “chernoff faces” to represent data. After editing that he decides to
use half of the “chernoff” face, the graphic would have the same effect and be using less
data ink.

A common principle that was found in Visual Display of Quantitative Information
(Tufte, 2001) was to revise and edit constantly without changing the meaning of the data.
Tufte (2001) notes that with respect to size and proportion, graphics lend toward the
horizon implying that graphics should be 50% more wide than tall. He states that people
tend to find discrepancies along the horizon easier and that it is easier to label from left to
right than top to bottom.

Volume two, Envisioning Information (1990) was written to show pictures of
nouns and visual design principles. The theme of this volume and also a design principle
is “escaping flatland” (Tufte, 1990). Tufte (1990) states that most all of the natural
worlds that we study are inevitably multivariate in nature; thus implying that we need to
increase the dimensionality that is represented on plane surfaces. The next principle is
economy of perception (Tufte, 1990) which means a steady canvas makes a clearer
picture. Tufte uses a set of air pollution graphics that he revises to have each individual
graphic be similar in order that the reader can easily notice the changes that occur.
Similarly, The Consumer Report uses circles in its product reports, and each circle
represents the same thing but the reader is focusing on the differences within the circle to
tell them which item is best. Color is a principle that Tufte (1990) describes that can play
many different roles in a graphic. Color can be used to label, to represent, to decorate and
to measure. According to Tufte color is a “natural quantifier”. However, color is
something that must be used in moderation and not excessively. An example of how
color is to be used is when he redraws the handcuff used by a magician with color and it
becomes evident to the reader where the piece of metal is located that the magician uses to free himself. The final principle that is particularly helpful for the menstrual cycle diagram is narratives in space and time (Tufte, 1990); this implies that we should present the entire cycle all the way to its rebeginning. Tufte uses a train time schedule to represent how best to display a graphic that presents a continuous cycle and the importance of showing the never-ending story that a cycle represents.

Volume three, *Visual Explanations* (1997) presents pictures of verbs. In this final volume Tufte (1997) begins with smallest effective difference. The graphic designer is to mute or decrease the secondary affects (i.e. labels, lines, boxes, legends, etc.) allowing the graphic to be presented clearly and with the least amount of clutter and distraction. An example that Tufte uses is the anatomy of a human ear. In the original graphic, it is difficult to distinguish where the part-naming lines are pointing as well as decide if the line is a part of the ear or not. Tufte edits the ear anatomy graphic, it becomes clear as to what a difference the intensity of a line makes in a graphic. The next principle in this volume is parallelism. Parallelism requires everything in the graphic to be consistent and predictably self-similar. For example, in the legend the main points of the graphic should be consistent with the items to which the legend refers. In the redesign of my menstrual cycle diagram, the symbols used within the calendar are the identical to the symbols used in the legend.

The final principle is visual confections (Tufte, 1997). The goal of this principle is to illustrate an argument, compare the real and imagined, present and enforce visual comparison, and tell yet another story. Examples of visual confections are presented in the ultimate weed graphic and the Potomac River graphic. The ultimate weed presents
pictures of nouns and verbs in one graphic; it informs the reader about the uselessness of
the plant by using callouts. The callouts explain different properties including how it is an
allergen, its toxicity to animals, and does not allow other plants to grow near it. Tufte
(1997) then includes a graphic from the New York Times about the dangers of the
Potomac River. In this graphic it is explained what not to do near the river as well as
what to do if a person has fallen in, such as to float face up downstream to prevent
drowning.

Before Edward Tufte wrote his three volume design series, Francis Dwyer
realized that graphic design was a problem in teaching and learning and decided to
research the area. In 1978, he authored a book entitled Strategies for Improving Visual
Learning that contains information/material similar to several of the design principles
that Tufte noted in his series. Dwyer discussed the limitations of the graphic and how the
graphic must provide the same learning outcome for each student. For further
explanation, Dwyer used a graphic of a teacher presenting the same graphic to four
different students. Unfortunately, only one student understood the graphic the way the
teacher intended while the other students each received something different from the
graphic. Thus, the graphic is as important as the accompanying text and should be
evaluated just as intensely. When the teacher presented the students with an effective
graphic, all students were able to interpret the graphic the same and understand the
teacher’s presentation. With this in mind, it is evident that the effectiveness of a graphic
needs to be evaluated and Dwyer investigated this with a series of studies using the
human heart as his focus.
Francis Dwyer and Edward Tufte were in agreement on two design principles that affect the redesign of the menstrual cycle diagram. The two principles are the use of color and the use of text with a graphic. Color is “an attention gaining and attention sustaining device” (Dwyer, 1978, p. 150). Dwyer and Tufte both agree that the use of color in a graphic affects learning. Dwyer (1978) experimented with color when he used eight different heart graphics which compared two illustrations—a black and white illustration with the same color illustration. The findings of Dwyer’s (1978) study are as follows:

1) There is an increasing amount of empirical evidence which tends to support the contention that the addition of color in visual illustrations does improve student achievement of specific educational objectives.

2) … people prefer to receive and interact with presentations that occur in color. (p. 150)

On the other hand, Tufte (1990) discusses the use of color by using the Euclidean proof in geometry as an example. The mathematical proof is first shown with many letters, no color and a few symbols to describe how to distinguish angles and other geometric shapes. Oliver Byrne redesigns the proof with colored shapes and lines to describe the angles and geometric shapes; Tufte appreciates the redesign because it allows the reader to better understand the proof.

In addition, Dwyer and Tufte both believe that it is important that the student visualize the graphic and have access to the complementary text when the material is being discussed to assist in learning and understanding of the graphic. Dwyer conducted
several studies to determine how printed content material complements visualization during self-paced instruction. Self-paced instruction is defined by Dwyer (1978) as “a learning situation in which each individual controls the rate at which he proceeds through instructional materials, …, textbooks, computer-assisted instruction, workbooks …,” (p. 102-103). His research indicated that “the use of certain types of visual illustrations to complement self-paced instruction can significantly improve student achievement of specific types of educational objectives” (Dwyer, 1978, p. 135). This design principle of graphic and text together is supported in Tufte’s third volume, *Visual Explanations* (1997). Tufte’s example is that of visual confections because the graphic and text tell a story that explains a concept to the reader. For example, the “ultimate weed” told a story and answered questions about the uselessness of the weed. Self-paced instruction also allows the reader to return to the graphic as many times as needed to learn the information presented.

**Memory and Learning**

“The single most important factor influencing learning is what the learner already knows. Ascertain this and teach him [sic] accordingly” (Ausbel, Novak, Gowin & Hanesian, 1978). This statement demonstrates a link between memory and learning--the brain. David Sousa (2001) defines learning as involving the brain, nervous system and the environment all working together in acquiring new information and skills (p. 84). The neuronal connections in the brain are the controls for knowledge (Zull, 2002). When new knowledge is being learned, there are several factors that determine the ability for the knowledge to be retained and recalled when necessary. The storing of this new
knowledge occurs when the hippocampus encodes the information and sends it to one or more long-term memory storage areas (Sousa, 2001).

Inside the brain, there are neuronal networks that are involved in learning (Zull, 2002). During learning, neurons are more active than normal thus creating more synapses. The synapses continue to get stronger as learning continues and a neuronal network is created. The neuronal network connects the concepts being learned for retrieval and recall. Previous knowledge has been stored as a neuronal network. As the student learns new information, the brain will create new neuronal networks. These new neuronal networks may trigger the old neuronal networks or previous knowledge creating a connection between the two networks. The connection between the two networks establishes a completely new neuronal network (old information and new information combined) that is created and maintained in long-term memory.

Alan Baddeley (1999) defines long-term memory as information stored for considerable periods of time with durable encoding and storage systems. Long-term memory information is processed by “interpreting, evaluating, comparing and contrasting new knowledge with existing knowledge” (Mintzes, Wandersee & Novak, 2005, p. 43).

Several researchers (Bruer, 1993; Mintzes et al., 2005; Tobin, 1993; Zull, 2002,) suggest that teachers realize that students have the old neuronal networks or previous knowledge that they bring with them to science class. The teacher then works to trigger these old neuronal networks to help establish the new ones (Zull, 2002). In triggering the old information along with learning the new information, the “learner begins to actively construct understanding by relating current experience, including classroom instruction to preexisting schemas stored in long-term memory” (Bruer, 1993, p. 131).
The ability of the learner to use his/her previous knowledge as a scaffold for new knowledge construction is the goal of meaningful learning theory in the human constructivist view. Human constructivist theory states that meaningful learning involves the linkage of newly learned concepts to concepts already stored hierarchically in long-term memory (Good, Wandersee, & St. Julien, 1993).

Community College and Its Students

In 1901 the first community college in the nation originated and developed due to the significant increase in population growth and demographic, social and economic change in the United States (Levinson, 2005). The community college has many benefits. The community college provides access to a population formerly excluded from other institutions of higher education. For example, the community college may provide developmental courses for students who are not academically prepared due to various reasons--lack of preparation in high school or returning to school after extended period of time. The community college also works closely with industry and governmental agencies to provide training for various occupations. At Baton Rouge Community College there is a 2-year program referred to as PTEC (Process Technology) that allows students to study common operating processes found in industrial plants and prepares the student to enter the employment market as an entry-level process operator. The community college is also a magnet for international students who wish to study in the United States (Levinson, 2005). Many students that attend community colleges are attending for the purpose of transferring their credits to a four-year institution. Basically, the community college is an all-around institution of higher learning, without out any restrictions on age, academic capabilities or nationality. Other reasons for attending
community college are lower cost and increased teacher/student interaction in the learning environment.

Throughout the 20th century there has been a steady increase in the number of students attending community colleges (Levinson, 2005). According to the Community College Survey of Student Engagement 2005 National Report, “almost half of the undergraduate students in public colleges and universities are now enrolled in community colleges.” These students are satisfied with their educational experience at the community college. A report by Clifford Adelmann, senior research analyst at the U.S. Dept of Education, in 2005 states that the community college is serving more younger adults today (Honawar, 2005). The need for the community college is to fill the gap between secondary and post-secondary schools. United States students are leaving high school and arriving at the community college in bigger numbers and at least 42% of students are under the age of 22 (Honawar, 2005). For this research study, that is important because according to the Alan Guttmacher Institute, the typical American woman has her first intercourse at age 17 (Sonfield, 2003). Of the women in the US who become pregnant yearly, only 8% use the pill and 85% do not use any form of contraception. This explains why about 7% of all U.S. women at risk of unintended pregnancy who do not practice contraception account for almost half of the country’s unintended pregnancies (Sonfield, 2003). The researcher hopes to help decrease this number for those who do not use contraception beginning at the community college level.

Sexuality Education

Sexuality education is defined by Louisiana law R.S. 17:281, as “the dissemination of factual biological or pathological information that is related to the
human reproduction system and may include the study of sexually transmitted disease, pregnancy, childbirth, puberty, menstruation, and menopause as well as the dissemination of factual information about parental responsibilities under the child support laws of the state” (SIECUS, 2004).

In an article by Katy Kelly entitled “Just Don’t Do It: Are we teaching our kids way too much about sex? Or not nearly enough?” (2005), she attempted to understand the views of parents and children on sex education and what should and should not be taught in the public school. According to this article, 88 % of middle and high schoolers pledge to stay virgins until marriage but end up having premarital sex and are less likely to use contraception during their first intercourse (Kelly, 2005). If students were presented with the whole story and not just the abstinence-only theme then there would possibly be an increase in contraception usage during the first intercourse. The Alan Guttmacher Institute (2002) reports that pregnancy rates have decreased some due to greater knowledge about contraception. Dr. Arthur Caplan (2005) wrote a commentary on sex and common sense in which he repeatedly stated that no research has been able to show that students taking the abstinence-only pledge engage in sexual intercourse less frequently than students not taking the pledge. However, the research shows that the students taking the pledge are more involved in sexual intercourse than the students who do not take the pledge. Dr. Caplan (2005) asks, Why should we tell the student’s one thing in high school and then the day they graduate the story changes? As a final thought, Caplan (2005) says “Science and common sense, not wishful thinking and hypocrisy, should guide what we teach kids about sex” (Hypocrisy section, last ¶).
In today’s public schools, there are two main types of sex education curricula—abstinence-only and comprehensive sex education. Both programs discuss male and female anatomy, human development through puberty, and include varying degrees of information on pregnancy. Abstinence-only teaches that abstinence until marriage is the only option and that if you are not married, you should not have sex. It does not mention contraception or sexually transmitted infections in any form. However, comprehensive sex education includes varying amounts of information on unwanted pregnancy prevention, contraception, and sexually transmitted infections (STIs). Comprehensive sex education may be referred to at times as abstinence-plus.

The abstinence-only curricula are most often the programs used in high schools for several reasons (Guttmacher, 2006). The first reason is federal funding heavily supports this model. The total funding for abstinence-only education in 2006 was 176 million dollars (Guttmacher, 2006). Since the 1990s, legislation that supports abstinence-only called the Adolescent Family Life Act, explicitly states that contraception usage and methods must be excluded from the curriculum (Landry, Daroch, Singh, & Higgins, 2003). The exclusion of this information means that students are not getting the whole truth about sexual intercourse. The student is not allowed to make an informed decision which may lead to unwanted pregnancies or STIs. Parents and various religious groups are strong supporters of abstinence-only model for the simple fact that this model promotes no sex before marriage (Rose, 2005). With this model, sexual intercourse is for the sole purpose of reproduction and contraception is not a concern because your intentions are to become pregnant. Some programs rely on religious doctrine and images of fear and shame in discouraging sexual activity (Rose, 2005). Others may point out the
ineffectiveness of contraceptives to encourage students to lean more towards abstinence-only. Unfortunately, there have been several studies that support the fact that several of the abstinence-only programs contain medically inaccurate and misleading information (Rose, 2005; Waxman, 2004; Wilkie, 2005).

An abstinence-only program used in Louisiana was evaluated by Yoo, Johnson, Rice and Manuel (2004), the students, teachers and principals were asked for suggestions to improve their sex education curriculum model, the Students of Service Program of Sexual Abstinence. The teachers recommended that sexually activity be discussed with two types of students in mind; first the student who has never engaged in sexual activity and second the student who has engaged in sexual activity. With this recommendation, the lawmakers and curriculum developers must realize that these programs cannot be a one-size fits all because students are at different levels that require different levels of information. The teachers’ suggestion sheds light on the fact that although the goal of this program is to target those who are not sexually active and to convince them to remain abstinent until marriage, there are still those students who already are sexually active and need to be given information on how to protect themselves and others, as well as how and why to refrain from sexual activity. The students suggested they get more reality-based information and that “they only say not to do something wrong and … nothing about what to do instead” (Yoo et al., 2004, p. 332). In this article it becomes evident that the student is asking for the information, but because of state law, cannot be provided this information about their health.

In comparison, the comprehensive curriculum or abstinence-plus curriculum teaches abstinence and provides information on pregnancy prevention, contraception and
STIs. This information allows the students to make an informed decision about their sexual lifestyle. Wiley (2002) points out that it is important to provide students with a balance between the proper way to use contraceptives as well as the consequences of not using them properly. Contrary to what those against comprehensive sexuality education believe, research does NOT show that the number of students who receive this type of education decrease the age at which they first engage in sexual intercourse (Dhingra, 2005; Hartmann, 2002; Kirby, 2000). As of March 22, 2007 there was a bill before Congress that supports comprehensive sex education that would allow states to receive federal funding. The bill was sponsored by Representative Barbara Lee (D-CA), Christopher Shays (R-CT) and Senator Frank Lautenberg (D-NJ) and is termed the Responsible Education About Life (REAL) Act (Dhingra, 2005; “Family Life”, 2004). This bill would allow schools to discuss the health benefits of contraceptives and condoms. According to the Advocates for Youth website (Dhingra, 2005), the REAL Act would use approaches that include information about abstinence and also contraception and condoms, from perspectives of both values and public health. The Real ACT is needed so that young people get the needed information to make informed decisions about their sexual health. Although research has shown that teenage pregnancy is down, it is not showing a corresponding decrease in STIs or new HIV cases. The Center for Disease Control and Prevention estimates that 19 million new sexually transmitted infections occur each year, almost half of them among young people ages 15 to 24 (Weinstock, 2004). In the United States about two young people are infected with HIV every hour of every day (Dhingra, 2005).
The programs that are used to prevent pregnancy and inform teenagers about contraception and sexually transmitted infections are the most valuable when they present them with the accurate information that allows them to make informed decisions, which was one of the goals of this proposed research. Characteristics of an effective sexuality education program have been described by Douglas Kirby (2000, 2001). The characteristics that are relevant to this research study include the following:

1) Focus on reducing one or more sexual behaviors that lead to unintended pregnancy or sexually transmitted infections, including HIV.

2) Deliver and consistently reinforce a clear message about abstaining from sexual activity and/or using condoms or other forms of contraception. This appears to be one of the more important characteristics distinguishing effective from ineffective programs.

3) Provide basic, accurate information about the risks of teen sexual activity and about ways to avoid intercourse or to use methods of protection against pregnancy and sexually transmitted infections. (Kirby, 2000, p. 74; Kirby, 2001)

James Wagoner, the president of Advocates for Youth, supports the theme that teens need information, not censorship (2001). He proposes that

Instead of fear, denial and blame, lets try rights, respect and responsibility… 1) young people have a right to accurate and complete information that could protect their health and even some of their lives, 2) young people deserve respect and 3) young people have an obligation to
act responsibly, to make safe and sound decisions about sexuality.

(Wagoner, 2001)

The best sexuality education that can be given to a student is the truth.

In April 2007, the Mathematica Policy Research, Inc. submitted a final report on “Impacts of Four Title V, Section 510 Abstinence Education Programs” to the U.S. Department of Health and Human Services. The report examined the programs on “adolescent sexual activity and related knowledge and behavioral outcomes” (Trenholm, Devaney, Fortson, Quay, Wheeler, & Clark, 2007, p. 59). After ten years of the abstinence-only until marriage program, the report finds there are “no overall impacts on teen sexual activity, no differences in rates of unprotected sex, and some impacts on knowledge of STDs and perceived effectiveness of condoms and birth control pills” (Trenholm et al., 2007, p.59). The report details the summary of each impact of the abstinence education programs and indicates areas associated with teen sexual activity that are of concern and need to be addressed. First, there is lack of knowledge of the consequences of STDs among the students who participated in the program compared to those students whom did not participate. The students have not grasped the concept that an STD could be contracted after only one act of unprotected intercourse. This however, is not a surprise when the discussion on STDs is limited in an abstinence-only program. Secondly, the report indicates that youth need to be targeted at an earlier age and the program should continue throughout high school. They suggest that the sexuality education begin earlier and/or be apart of the curriculum continuously, not a one-time lesson, which does not allow for students to revisit the topic and possibly ask questions
and get answers to new questions that may develop. Finally, the report suggests that peer networks be developed to assist students after they have completed the program. The ability to interact with others after the student has left high school or even during school breaks may allow the student to discuss their issues with others who may be able to offer them some non-judgmental peer advice. The authors of this report find that there is a continuous need for research to be conducted on how to combat the high rate of teen sexual activity and its negative consequences (Trenholm et al, 2007).

The advocates for comprehensive sex education were awaiting this delayed report and were not surprised about its results. Karen Pearl, the interim president of Planned Parenthood of America (PPA), indicates that this information is not a surprise because existing research has already shown that comprehensive sexuality programs that include messages about both prevention and abstinence have been proven effective and yet, federal and state governments continue to dump millions of dollars into abstinence-only programs that are not effective, . . . (PPPA, 2007).

William Smith, vice president for public policy of the Sexuality Information and Education Council of the United States (SIECUS), agrees with Karen Pearl and even asks what is going to happen now that this report has been released. Smith implies that Congress has seen the report and now has to decide if they are going to continue to support programs, that do not work, abstinence-only or use the federal dollars to support programs that have been proven to work, comprehensive sexuality education (SIECUS, 2007). It may require that more states refuse the federal money that supports abstinence-
only programs to send a message that the education of the youth is what is important. In an editorial of the American School Board Journal, they polled several of their readers, members of school boards across the nation, to determine which approach was best for students and from their response, most people agreed with Linda Smith Kortenmeyer who said that abstinence-only isn’t enough (Zakariya, 2006). This was done before the report was released in 2007 and implies that the people want more for the students as stated previously in my research report. Society is starting to realize that youth of today are not like they were 30 years ago and they need to be given the whole truth about sexuality education to help them make the right choices about their lives.

The Media and Sex Education

Traditionally when it comes to obtaining information on sex, society has gone to Dr. Ruth Westheimer for advice. Dr. Ruth believed that America needed to be able to talk openly about sex and that there was a high demand for the information (Westheimer, 1983). As a sex educator, her goal was to help adults with their sexual problems and be a listener for teens who do not feel comfortable talking to their parents. Although the glamour of Dr. Ruth may have faded over the years, there is still a need for her type of open discussion of sex and sexuality.

For parents to begin the “sex talk” with their children, they may use the old standby method of just purchasing books for the child to read on their own. This method may work for some but parents should read and evaluate the books to determine if they information inside is what their child needs. On the shelves at the local bookstore or library, there are several books that can assist the parent in opening the lines of
communication with their children. Several books have been analyzed for their content on the menstrual cycle and related issues.

The Period Pocketbook: Honest Answers with Advice from Real Girls (Kreitman, Finaly & Jones, 2006) is a mini question and answer guide for teens to help with the questions about their period. The authors answer basic questions that may arise when a girl first gets her period. “Chapter 4: What does having a period really feel like?” includes facts and figures of the period, i.e., How often will I have a period? How long will they last? To answer these questions, the authors state, “It is useful to keep a record of when you have your period so that you can eventually work out your cycle and calculate when your next one is due…” (p.44) and “…when you mark your diary you could also put a check mark for each day you bleed so that you can see how long your periods are lasting”(p. 45). In both answers the authors details the importance of charting your cycle but does not tell the teenager the importance of knowing when your period will begin--other than for the lack of embarrassment.

For a more comprehensive discussion that includes more than just information on menstruation, Robie H. Harris and Michael Emberley have written It’s Perfectly Normal: Changing Bodies, Growing Up, Sex and Sexual Health (2004) for both girls and boys. In this children’s book, the authors use “the bird and the bee” as cartoon commentators throughout the book. Their style is an information source that defines several terms and details all related information on that term. Harris and Emberley (2004) include a body fact--which is scientific statements that provides the child readers and their parents with physiological knowledge about the organs or event that is being discussed. For example,
in the chapter on “Making Babies: Sexual Reproduction” the body fact on outside and inside the female organs/male organs reads:

At birth, a baby girl’s ovaries already contain an astonishing number of egg cells--about one to two million. These egg cells are not grown up enough to produce babies until a girl begins to go through puberty. Female puberty--the time when a girl’s body starts to grow into a young woman’s body--can begin anytime from about the age of eight or nine until fifteen. At puberty a girl has about three hundred to four hundred thousand egg cells. A female’s egg cells are no longer able to produce babies after the female is about fifty. (Harris & Emberley, 2004, p. 24).

By providing this body facts, as well as the others throughout the book, the child can easily refer back to this information later when questions arise about why certain events are taking place. In addition, the authors detail the travels of the sperm and state how many sperm are produced by a testicle. According to Harris and Emberley (2004) “about one hundred million to three hundred million sperm are produced per day; that’s anywhere from one thousand to three thousand sperm every second” (p. 37). The authors even dispel myths about sex and sexuality in the text and enhance the text with excellent, science accurate visuals. This book is one that the parents can give to their child that will never become obsolete, and will definitely aid them in opening the lines of communication about sex and related topics.

For the more trend-oriented teen, there is *ASK COSMO GIRL! About Your Body: All the Answers to Your Most Intimate Questions* (Cosmo, 2006). This is a question and answer guide compiled by the authors of *COSMO* magazine to help girls with questions
about the changes in their bodies. However, it does not get into any detail about the menstrual cycle and is more sex driven with less science-oriented questions. The questions that are relevant to the menstrual cycle include “What is period blood anyway? Is there anything in it besides blood? What about those dark clumps?” Unfortunately, the authors may have assumed that if the girl is reading *COSMO*, she knows and understands the basics of the menstrual cycle and these need not be covered again.

*What’s Going on Down There? Answers to Questions Boys Find Hard to Ask* (Gravelle et al., 1998) is a handbook about puberty that was written for boys and the author actually involved two pre-teen boys with her development of the book. There is also a version for girls. This book is as effective in presenting useful and readable information on puberty as *It’s Perfectly Normal: Changing Bodies, Growing Up, Sex and Sexual Health* by Harris and Emberley, but written in a different style. This is yet another sex education text that dispels myths about sex and sexuality. In chapter 6 “Making (and not Making) a Baby” the author includes one of the most fundamental statements in sex education:

> the most important factor is whether a sperm and an egg actually have a change to meet in the first place. As you may remember, a woman’s ovaries release a mature egg only once a month. If a couple has sex when there is no mature egg available, fertilization cannot occur. Nor can anything happen if the egg is released but there is no sperm around

(Gravelle et al., 1998, p. 73).

The inclusion of this statement will affect more teens than the author can imagine because it is one of the central concepts educators want students to understand about
fertilization and pregnancy. This text goes as far as to discuss the rhythm method and that “the biggest difficulty is determining when an egg is actually going to be released” (p. 78). The concept of ovulation being mentioned in a text for boys is in agreement with this researcher’s stance that it is important to teach boys as well as girls about the events of the menstrual cycle. To get even deeper in the menstrual cycle and its events, the author includes the following: “the length of the cycle varies, the life of the egg is also variable and the life of the sperm is between three to five days” (p. 79). To her credit, Karen Gravelle has not overlooked even one key idea related to the menstrual cycle and pregnancy in sex education.

The aforementioned sex education trade books are some examples of printed media that parents can actually purchase for their children. In today’s society most information obtained by youth is through the internet and the television. There are several websites that provide scientifically accurate information for pre-teens and teens as well as parents, including--Planned Parenthood, GoAskAlice, and Advocates for Youth, and The Alan Guttmacher Institute. There are other websites that parents may want to preview to determine granting access to the children to determine if they would like their child exposed to certain topics, including Dr. Ruth’s website and the Talk Sex With Sue website. Both of these two sites are linked to two well-respected women in television sex education--Dr. Ruth Westheimer and Sue Johanson.

Dr. Ruth, as mentioned previously, is a sex educator who took sexuality to a new level by being very open with her audiences. The new grandmother on late night is Sue Johanson, registered nurse and sex educator, who also talks openly about sex with her audiences. Sue has a talk show on the Oxygen channel entitled Talk Sex With Sue. Her
show is aired on late night television and features a live question/answer session with callers, as well as discussion in other areas of sex and sexuality.

Another source of information for sex education or more specifically, the menstrual cycle is the Catholic Diocese. The Catholic Diocese teaches and/or endorses natural family planning or the ovulation method (sometimes called the Billings method), all of which call for the woman (and her husband) to know her body and constantly chart her cycle (Northwest Family Services, 2003; Pope Paul VI Institute Press, 2002; Taylor, Nerburn, Hogan, 2000; Couple League, n.d.a&b; Weschler, 2002;). Natural family planning methods are, by definition, those that take advantage of the biological fact that women are at most times, infertile throughout the whole of the reproductive phase of their lives. The Couple to Couples League believes that natural family planning is based on awareness of a woman’s fertility. By becoming aware of the changes that occur during the menstrual cycle, changes in the pattern of the menstrual cycle can alert a woman to possible medical problems (CCL, n.d.a). Northwest Family Services provides a Microsoft Excel spreadsheet on their website that allows the woman to chart her cycle including basal body temperature, cervical mucus. The natural family planning method can be used for both pregnancy planning and pregnancy prevention. The choice becomes that of the couple--because the woman understands her body and can predict when she will ovulate which determines the next decision she will make. With natural family planning, both the woman and man are able to make an informed decision about their sexual activities.

There have been several different media options--sex education texts, internet websites, late night television and the Catholic Diocese--presented to illustrate that there
is information available to understand the menstrual cycle. However, the responsibility lies with the parent and the child.

**Hormonal Control of the Female Reproductive Cycle**

In the female reproductive system there are specific mechanisms that are responsible for the changes that occur during the menstrual cycle. The changes that occur during the menstrual cycle are brought on by fluctuations in hormones at different times of the month. The hormones of the female reproductive system are circulating continuously through the bloodstream. The hormone interaction is coordinated between the pituitary gland and gonads, which allows for proper functioning of the ovarian and uterine cycles. The hypothalamus is the regulator of reproductive function in the female. Gnadotropin-releasing hormone (GnRH) is released from the hypothalamus in a pulse-like manner. There are cells in the pituitary, gonadotrophes, that are responsible for luteinizing hormone (LH) and follicle-stimulating hormone (FSH) production. When there is a shift in the pulsation, the secretion levels of LH and FSH change; at times, FSH may be the primary hormone released and other times LH is the primary hormone released. The pulsation of GnRH is controlled by estrogen and progesterone. Estrogen is released from the ovary. Progesterone is released from the corpus luteum that has developed after the follicle ruptures during ovulation.

The follicular phase is the first phase of the female reproductive cycle. The pituitary produces and secretes FSH. When the FSH is secreted, the ovaries are stimulated to develop new primordial follicles each month. The primordial follicle goes through a process of recruitment, selection and dominance. Recruitment is when a group of follicles begin to grow and estrogen begins to increase. Some of these follicles grow
and are selected whereas others become atretic (degenerative). Inhibin, a protein hormone, is being released by the selected follicles inhibiting the release of FSH and LH. The dominant follicle produces more estrogen thus stimulating the preovulatory surge of LH. The high levels of LH cause the dominant follicle to burst and release the mature and fertilizable egg. Smooth muscle contractions of the ovary are caused by prostaglandins (Asso, 1983; Senger, 1999).

During the time of follicle development, the uterine cycle is undergoing several changes. First, menstruation occurs; the lining of the endometrium is being shed. This event represents an egg has not been fertilized and the female is not pregnant. The increase in estrogen stimulates the repair and regeneration of the endometrial lining, the proliferative phase, in preparation for the egg that will be released and (assumably) fertilized to implant in the endometrial lining.

The trigger of LH release marks the beginning of the luteal phase. The levels of progesterone increase at this time due to the rupturing of the follicle and formation of a corpus luteum. There is decreased pulse frequency of GnRH from the hypothalamus reducing the secretion of FSH and LH. The sustained release of progesterone during the luteal phase is preparing the uterus for pregnancy by enhancing the blood supply to the functional zone and stimulating secretion of the endometrial glands (Martini, 2001). If the egg becomes fertilized, the corpus luteum continues to produce progesterone and the placenta begins to secrete human chorionic gonadotropin.

However, if pregnancy does not occur, the corpus luteum degenerates and progesterone and estrogen levels decrease. The GnRH pulsation begins to increase, thus increasing the FSH levels and decreasing the LH levels being secreted. In the
endometrium the glands increase their secretory activities due to the release of estrogen and progesterone. This is the end of this month’s menstrual cycle and the next month’s cycle begins with menses.

The History of Contraception

The concept of fertility control or contraception can be dated back to several primitive societies. Norman Himes (1936) cites several African tribes with herbal, ritual, or magical remedies for contraception. In South Africa, it was common for a married couple to abstain from intercourse until the baby begins to crawl (Himes, 1936). In North African tribes, the women drank gun powder or the foam from a camel’s mouth and believed that this would prevent her from getting pregnant (Himes, 1936). In New Guinea, women chewed tree leaves and swallowed the juice. A more scientific approach was described in South America where the women used a douche solution containing lemon juice. This citric acid solutions act as a spermicide (Himes, 1936). This method of contraception has been documented in different cultures of the world. It was recommended in the mid-1800s by Dr. Charles Knowlton as an effective contraceptive. This practice highlights a misconception that is still valid today--that douching after unprotected intercourse (no chemical agent present in solution) will prevent pregnancy from occurring.

The contraceptive methods of the Egyptians and the Romans can also be found in similar methods used in today’s society. For example, the diaphragm had several precursors in the form of pessaries and/or suppositories. The Egyptians used two types of pessaries or suppositories: one contained crocodile dung in a paste-like form (which has been proven to have alkaline properties associated with spermicide) and the other a plug
or block that would prevent sperm from traveling to the cervical opening (Himes, 1936; Senanayake & Potts, 1995). Another form of the diaphragm was described by Soranos of Ephesus. He suggested “soft wool be introduced into the mouth of the womb or the use of an astringent or occlusive pessary before coitus to prevent sperm from entering the *os uteri*” (Himes, 1936). During the 18th century, a half lemon from which the juice had been extracted was used similarly to the cervical cap of today (Senanayake & Potts, 1995).

The condom made its first appearance, not as a contraceptive method, but as venereal disease prevention. The original condom was made by Gabriel Fallopius in the fifteenth century. He used a linen sheath. He is also credited with the first recording of human medical trials because he tested his linen condom on thousands of men. (Himes, 1936; Hughes, 2002; Senanayake & Potts, 1995). It was not until the 18th century that the condom began to be used as a contraceptive method. Thanks to Charles Goodyear and his vulcanization of rubber, the condom went into mass production in the 1840s.

The advocacy for contraception began during ancient Greek civilization, with a theory of population control. By controlling the population, food and work shortages would be prevented along with the ability to prevent pregnancy, thus preventing abortion. Plato and others believed that procreation should be regulated by law (Himes, 1936). In 1823, Francis Place distributed the Contraceptive Handbill that discussed two methods of birth control (Himes, 1936; Senanayake & Potts, 1995). The first describes a sponge with a string that is to be inserted before coitus and removed after coitus. The second method is possibly a direct link to a contraceptive method myth that persons still believe today. Francis Place states:
the other method to, when from carelessness or other causes the sponge is not at hand, is for the husband to withdraw, previous emission, so that none of the semen may enter the vagina of his wife. But a little practice and care in the use of the sponge will render all other precautions unnecessary (Himes, 1937, pp. 214-216).

As Francis Place recommended in 1823, and the Alan Guttmacher Institute, Planned Parenthood, Center for Disease Control and various other organizations recommend today early withdrawal is not the best method and it has about a 75% success rate with typical use. This is due to the fact that there may be viable sperm in the pre-ejaculate that may reach the cervix. In 1914, Margaret Sanger writes in her journal, The Woman Rebel, how women should avoid pregnancy and later coined the term “birth control” (PBS, 2002). Opponents of contraception at the time were most notably, the Catholic Church and Anthony Comstock. Anthony Comstock was salesman, and anti-contraception crusader who himself wrote an anti-obscenity bill, including a ban on contraceptives that was later passed and known as the Comstock Act (PBS, 2002; Senanayake & Potts, 1995). The statute defined contraceptives as obscene and illicit, making it a federal offense to disseminate birth control through the mail or across state lines (PBS, 2002; Senanayake & Potts, 1995).

Before hormonal contraception and after the herbal remedies, the “Rhythm Method”, which aligns intercourse with the events in the menstrual cycle, was devised by scientists (PBS, 2002). Norman Himes author, of Medical History of Contraception (1937), predicts that the chemistry of contraception may lead to new developments on the future. The method that Himes was referring to was the use of hormones to control the
female reproductive cycle. The first documented research with hormonal control of the mammalian reproductive cycle was the work of Ludwig Haberlandt and his work with rabbits. In 1919 Haberlandt recognized that the corpus luteum or “yellow body” that results after the egg is released is the primary cause that rabbits remained infertile for several months (Djerassi, 2001). He was also one of the first to point out that “oral administration of progesterone, which is demonstrated in mice, would be the method of choice as well as the necessity for periodic withdrawal from the hormone to allow menses to occur” (Djerassi, 2001, p. 17). The goal of this hormonal research was not to create a contraceptive, but to treat infertility, menstrual disorders, and cervical cancer.

One of the early advocates for contraception, Margaret Sanger, was able to get contraceptives removed from the list of obscene materials or the Comstock Act in 1936 (PBS, 2002; Watkins, 1998). In 1940s, progesterone and estrogen were isolated and experimentation with these hormones as therapeutic agents began (Watkins, 1998). Shortly thereafter, chemists began to study the synthesis of hormones. From this point on, there was a sense of competition between researchers to determine who could synthesize and produce a steroid hormone first. The focus began with the sex hormones. The first synthesis of the hormone progesterone was accomplished on October 15, 1951 by Carl Djerassi (Djerassi, 2001; PBS, 2002). Dr. Elva Shipley later confirmed the oral progestational activity of progesterone and sent the information out to several researchers across the world (Djerassi, 2001). One of the researchers who received Shipley’s results was Gregory Pincus of the Worchester Foundation. Gregory Pincus had been approached by Margaret Sanger and Katherine McCormick during the time of Djerassi and Shipley’s discoveries to develop a form of contraception that used hormones. Pincus agreed to
work on the pill’s development but requested a substantial amount of money for the research.

Pincus found that the progesterone is not able to be orally ingested but must be combined with another steroid (Djerassi, 2001). The second steroid that was chosen for combination with progesterone was estrogen. M.C. Chang, a student of Pincus, administers the two steroids—not the form of progesterone synthesized by Djerassi—to female rabbits by mouth, by injection, and placement inside the vagina, and found that all locations inhibited ovulation (Watkins, 1998). With these results, Pincus was ready to begin clinical trials but was not confident in how to conduct this new phase of the research. John Rock, a clinical endocrinologist and gynecologist, assisted Pincus in the clinical trials of the pill that were conducted in Puerto Rico.

In May 1960 the Federal Drug Administration approved Envoid as an oral contraceptive but the pill could not be taken for no more than 2 years at a time (Djerassi, 2001; Ortho-McNeil, 2002; PBS, 2002; Watkins, 1998). According to Watkins (1998), Envoid's mode of action was to induce a physiological state which simulated early pregnancy—except there is no placenta or fetus. Envoid was found to be as safe as a normal state of pregnancy.

Once the pill had been released questions of pill safety started to surface. Several issues that surfaced included: a) healthy women were taking a drug for a long period of time that did not cure any type of disease and b) possibility of blood clots and cancer (Watkins, 1998). The issues were investigated by Pincus and his team, but had difficulty with participants remaining in the studies, due to the researchers’ ability to track their pill
usage (Watkins, 1998). However, Pincus did determine in 1961 that these contraceptives did not prevent cervical cancer (Watkins, 1998).

Modifications of the original pill led to other contraceptive methods including:

a) Implant (Norplant)--1990
b) Injections
   a. Depo-Provera--1992
   b. Lunelle--2000
c) Patch (Ortho-Evra)--2001
d) Vaginal Ring (Nuva Ring)--2001
e) 91-day pill regimen (Seasonale)--2003
f) Emergency Contraception (Preven & Plan B)

These pill modifications are altering the normal menstrual cycle in several different ways. It is important to understand the differences in oral contraception and its mechanisms for your specific situation. The modification of the pill is ongoing in the drug industry because the pharmaceutical companies are attempting to develop more ways to prevent menses.

Menstrual Cycle Representation

As a preliminary to the study, a closer look was taken at the current diagrams that represented the menstrual cycle. A total of 14 different menstrual cycle diagrams were located and analyzed (see Table 1. and Appendix D). The diagrams were
evaluated on the following: a) shape = circular versus linear, b) number of panels or boxes located within the diagram, c) total number of colors used, d) colors of hormone levels (E<sub>2</sub> = estrogen, P<sub>4</sub> = progesterone, LH = luteinizing hormone, FSH = follicle-stimulating hormone, GnRH = gonadotrophin-releasing hormone), e) anatomy graphics (ovary, uterus, follicle) and f) unique features (specific feature of diagram).

Overall, there were more linear diagrams than circular diagrams; linear diagrams were found more in textbooks and the circular diagrams on fertility or natural family planning websites. There were two diagrams that represented the hormone levels by using the same colors. From this analysis, there appears to be a need for the combination of both linear and circular diagrams—namely, the calendar format.

The calendar format was been chosen by the researcher as the focus of the research. At an early age females are taught to chart their menstrual cycles on a calendar to predict their next “period” or menses. With some early teen classes the pamphlet that is provided includes a calendar for the first year to help the pubertal female through her first menstrual cycles. By learning to use a calendar to predict her cycle in this manner, she can also use the calendar to determine her “contraception alert” days and her safe intercourse days. The calendar represents a recurring event that will occur every 28 to 30 days, depending on the month. Edward Tufte (1990) uses a principle described as narrative of space and time to suggest that events are recurring and should be presented in more than one complete revolution of the cycle—to show overlap. This principle is also important for the calendar format of the menstrual cycle diagram.
### Table 1. Summary of Menstrual Cycle Diagram Classification

<table>
<thead>
<tr>
<th>Diagram Number</th>
<th>Linear vs Circular</th>
<th>Number of Panels/slices</th>
<th>Total Number of Colors used</th>
<th>Colors of Hormone Levels</th>
<th>Anatomy Graphics</th>
<th>Unique Features</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>E₂</td>
<td>P₄</td>
<td>FSH</td>
<td>LH</td>
</tr>
<tr>
<td>1</td>
<td>Linear</td>
<td>5</td>
<td>10</td>
<td>Teal</td>
<td>Blue</td>
<td>Pink</td>
</tr>
<tr>
<td>2</td>
<td>Linear</td>
<td>6</td>
<td>14</td>
<td>Pink</td>
<td>Black Dots</td>
<td>Teal</td>
</tr>
<tr>
<td>3</td>
<td>Linear</td>
<td>4</td>
<td>9</td>
<td>Red</td>
<td>Violet</td>
<td>Black</td>
</tr>
<tr>
<td>4</td>
<td>Linear</td>
<td>0</td>
<td>8</td>
<td>Red</td>
<td>Green</td>
<td>Blue</td>
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<tr>
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<td>5</td>
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<td>Teal</td>
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</tr>
<tr>
<td>6</td>
<td>Linear</td>
<td>0</td>
<td>4</td>
<td>None Shown</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>7</td>
<td>Linear</td>
<td>7</td>
<td>10</td>
<td>None Shown</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>8</td>
<td>Circular</td>
<td>0</td>
<td>2</td>
<td>None Shown</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
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<td>Circular</td>
<td>3</td>
<td>1</td>
<td>None Shown</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>10</td>
<td>Circular</td>
<td>2</td>
<td>3</td>
<td>None Shown</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>11</td>
<td>Circular</td>
<td>28</td>
<td>3</td>
<td>None Shown</td>
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</tr>
<tr>
<td>12</td>
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<td>3</td>
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<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>13</td>
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<td>9</td>
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<td>Violet</td>
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<tr>
<td>14</td>
<td>Linear</td>
<td>4</td>
<td>10</td>
<td>Red</td>
<td>Green</td>
<td>Blue</td>
</tr>
</tbody>
</table>

**Research Methodology**

Qualitative and quantitative research methods have been the topic of debate in education for many years and will continue because a single preferred method, qualitative or quantitative has not been adopted by educational researchers. The consensus among educational researchers has been to follow the suggestions of Patton (2002) and Tashakkori and Teddlie (1998) and determine the research design by answering the following questions: a) Which research design is best? b) Which strategy will provide the most useful information?
Quantitative research is defined by Patton (2002) as standardized measures used to fit a limited number of responses in predetermined categories from a large population. Typical quantitative research uses surveys, attitude scales, and testing instruments. The advantage of quantitative research is that it allows the researcher to study a large population (Creswell, 2002; Patton, 2002; Tashakkori & Teddlie, 1998). The disadvantage is that there is little depth that can be achieved with a quantitative study. On the contrary in a qualitative study you are able to achieve depth but your population is smaller because of the time required to effectively conduct a qualitative study. A qualitative study describes the attitudes and behaviors of a population in detail. To use both quantitative and qualitative methods allows the research to include a large population, but also to include the details from interview and observations of a selected sample.

Mixed Methods is defined by Tashakkori and Teddlie (1998) as a combination of quantitative and qualitative methods in a single or multiphase study. Creswell (2002) states that a mixed methods study is one that adds a qualitative component to an otherwise quantitative study and vice versa. A mixed methods study brings together two research methods to give you a better product because it consists of the best of the quantitative research and the best of qualitative research. This research study used a mixed methods design. The qualitative data (interviews) underwent both a qualitative analysis (content) and a quantitative analysis (coding). The quantitative data (survey) underwent a quantitative analysis (statistical) and a qualitative analysis (content).

According to Tashakkori and Teddlie (1998), there are several quality issues that must be considered when using a mixed methods model. In quantitative studies, external
validity relates to the instrument and the ability to generalize results to another population that has the same characteristics (Tashakkori & Teddlie, 1998). In a qualitative study, external validity is referred to as transferability and the ability that the study can be transferred from one specific context to another (Tashakkori & Teddlie, 1998). A mixed method strategy allowed the researcher to combine the two and be able to generalize to an entire population as well as to transfer to a similar specific context.

The next issue is internal validity or trustworthiness. Internal validity in quantitative research allows the researcher to determine the data that were manipulated is the cause for the effect; basically can the variable be explained with a plausible explanation (Tashakkori & Teddlie, 1998). Trustworthiness helps the researcher determine if the research is actually worth paying attention to (Tashakkori & Teddlie, 1998). Lincoln and Guba (1985) described several techniques that will increase the trustworthiness of a study but only a few were used in this study. A member check allows the researcher to verify the observations in the setting are what they notice. Peer debriefing allows the researcher to ask others in the area to view the data that have been collected and arrive at the same conclusions. Triangulation provides a built-in confirmation because the researcher can compare two sources, two documents or two observers which help her to assure accuracy in the research. For this study, there were two types of triangulation used; triangulation of methods (both qualitative and quantitative) as well as triangulation of data (both qualitative and quantitative). In a mixed methods study, the researcher is able to use multiple forms of trustworthiness in order to convince others that the study is worth paying attention to.
The sampling technique that was used in this study is purposeful sampling because the students selected were in a specific course that ensured that the concept has not been discussed in elaborate detail. Patton (2002) described this type of sampling as the selection of information-rich cases strategically and purposefully; specific type and number of cases selected depend on study’s purpose and resources.

The two types of data that have been collected in this proposed study are survey results and interview responses. The interviews were a structured format. Novak and Gowin (1984) report that “the clinical interview, when well executed, provides by far the most penetrating assessments of student’s knowledge” (p. 128). The interview questions were based on questions that the researcher has established from misconceptions during previous experience with the concept.

The issue of reliability and validity is important to all research. In this study, the researcher was the data collection instrument (Patton, 2002). The reliability and validity are dependent on the skills of the researcher because qualitative analysis ultimately depends on the analytical intellect and style of the analyst; the great strength and weakness of qualitative inquiry and analysis (Patton, 2002). As an experienced educator, the researcher is prepared for misconceptions and errors that may be revealed during the interview process.
CHAPTER 3

METHODS

Research Design

This research study was an exploratory investigation of how students learn and apply the menstrual cycle diagram to pregnancy prevention. The research question was best answered using a mixed method design comprised of both qualitative and quantitative methodologies during data collection and analysis (Tashakkori & Teddlie, 1998). The units of analyses were the individual students’ participating in the study, and the menstrual cycle calendar activities. The different phases of the research project have been detailed by Gowin’s Vee Diagram (see Figure 2) and the Flow Chart of Research (see Figure 3).

Research Site

Urban Community College is an institution located in an urban area of the southern region of the United States offering associate degree programs. The enrollment at Urban Community College is approximately 6,500 students per semester. This institution is accredited by the Southern Association of Colleges and Schools. Urban Community College offers degrees and certificates in five areas--Business Technology, General Science, General Studies, Liberal Arts and Process Technology. The institution participates in a statewide articulation consortium allowing students to transfer to other public institutions within the state. This site was selected because the community college offers a traditional, transferable introductory biology course taught by experienced instructors. Also, the researcher is familiar with the instructors and the dynamics of the community college system.
Rural Community College is an institution located in a rural area of the southern region of the United States offering associate degree programs. The enrollment at Rural Community College is approximately 1,150 students per semester. This institution is accredited by the Southern Association of Colleges and Schools. Rural Community College offers degrees and certificates in three areas--General Science, General Studies, and Liberal Arts. The institution participates in a statewide articulation consortium allowing students to transfer to other public institutions within the state. This site was selected because the community college offers a traditional, transferable introductory biology course taught by experienced instructors. Also, the researcher is familiar with the instructors and the dynamics of the community college system.

Research Participants

This research study was conducted with students enrolled in five introductory biological science courses. The study was conducted in all classes as the unit on human reproduction. The students had not received any prior instruction on the menstrual cycle during the course. A purposive sample (Tashakkori & Teddlie, 1998) of 30 students, six from each course was selected to participate in interviews outside of normal class meeting times. Students volunteered for interviews and were recommended by the instructor. The student sample represented a cross section of the class including males and females as well as various achievement levels.

Data Collection

The study used several data collection methods to provide a comprehensive approach for detecting and documenting learning and application of the concepts. The procedure for data collection is outlined in the Flow Chart of Research (see Figure 3).
Interviews

The student sample was interviewed after the presentation of information. The interview plan is illustrated in the Flow Chart of Research (see Figure 3) and followed a set protocol (see Appendix H). The two types of menstrual cycle diagrams and the Menstrual Cycle Knowledge Survey were used during the interview to ask for student clarification.

Menstrual Cycle Knowledge Survey

The menstrual cycle knowledge survey was administered as a pretest and posttest (see Appendix C) to all students in the courses. It was developed by the researcher (see Appendix C) and evaluated by Dr. Evelyn Hayes, a practicing obstetrician/gynecologist.

Protection of Human Subjects

An application for exemption for Institutional Review Board (IRB) oversight was submitted and later approved. A copy of the approved application is included in Appendix F. Both research sites were provided with a copy of the approved application and the consent form that each student received. The consent forms were given to each student who participated in the study. Also included in Appendices G-I are copies of the consent form and the interview protocol as well as copies of the letters that were sent to each of the research sites.

Data Analysis

Several statistical methods were used to analyze this study. Quantitative data analysis was run using the statistical software package SPSS (2007).
Question 1. What difference in scientific understanding results from studying human reproduction with a layered-linear type menstrual cycle diagram, as opposed to a content-equivalent calendar type menstrual cycle diagram?

The percentage correct for each question on the pretest and posttest and the statistical significant difference were calculated using Pearson’s chi-square test. Pearson’s chi-square test was used to analyze the data because the data collected were categorical data not continuous data. This type of statistical test allowed the researcher to determine if the number of occurrences of correct answers between the pretest and posttest categories was random or systematic. The data were then summarized by reporting the percentage of individuals falling into the correct or incorrect category.

A paired $t$-test was performed to determine if there was a statistically significant difference between the pretest and posttest scores for the classes of students, overall and by category, who participated in the study. This type of statistical test was performed because it allowed the researcher to compare the means of the test scores from each group and evaluate the differences between scores.

Question 2. Which graphic design, given the variety that exists for each of the two diagram types, appears to be optimal for maximizing scientific understanding and the ability to use scientific information personally?

The clinical interviews were tape-recorded and transcribed for analysis. The transcripts were read several times for strict criteria and meanings. The data were analyzed and patterns located within. Coding was also performed. Additionally, the student’s responses from probing during the interviews were correlated with the data from the posttest. A partitioned content analysis was performed on the qualitative data
with respect to student understanding and the variables of gender, age category, prior knowledge, childbearing experience and geographic area.

The (survey results) quantitative data underwent a quantitative analysis using descriptive and inferential statistics. Student responses to the knowledge survey were reported in terms of the percentage of correct answers about the menstrual cycle. These percentages were presented as a total survey score, and as scores for specified areas of the cycle. Suggestions were made for future studies, as well as how to introduce these findings to the reproductive health community.

Limitations

The study was an exploratory study that has limited generalizability due to the sample size and composition. The sample was composed of students that have recently graduated high school and students who have been out of high school for several years, which limits generalizability and transferability to all college students. There were also limitations in sample size, as students dropped the course or did not attend on the days of the presentation.

The Menstrual Cycle Diagram Study

The menstrual cycle diagram study has four components: pretest, presentation, posttest and interview. The researcher administered the same knowledge survey for pretest and posttest (see Appendix C). The linear format of the menstrual cycle diagram and the calendar format of the menstrual cycle diagram were used in the presentation. The participants received two different types of presentation. First, each class was given the same pretest. Then, two classes were presented with the linear format of the menstrual cycle diagram and provided with copies of the diagram. The three other classes were
presented with the calendar format of the menstrual cycle diagram and provided with copies of the diagram. The week following the presentation, the students were given the same posttest. After the posttest, the students who were presented the linear-formatted diagram were presented the calendar formatted diagram. The students who were presented the calendar formatted diagram were presented with the linear formatted diagram. Students that volunteered for the interviews were asked the same questions from the interview protocol (see Appendix H). Because the students were required to meet outside of class for the interviews, they were compensated with a gift card to a local fast food restaurant. The interviews were tape-recorded and transcribed for analysis. After students were presented both diagrams, they were expected to be able to make meaningful decisions about their reproductive health.

Methods must fit the questions being asked. Thus, when it comes to designing an evaluation, the evaluator has to remember not only the specific questions being addressed, but also the audience for the research. Both must influence the selection of an evaluation design and tools for data collection. Mixed method designs can often yield richer, more valid, and more reliable findings than evaluations that are qualitative or quantitative alone. Another advantage is that a mixed method approach could increase the acceptance of the findings and conclusions by diverse groups affected by the findings. This study’s findings were aimed to inform US life science educators, community college instructors, and community college students.
CHAPTER 4
RESULTS AND DISCUSSION

Survey Results

Prior to viewing the presentation, each class was given a menstrual cycle knowledge survey. The same instrument was administered as the posttest. The survey was developed by the researcher and evaluated for content validity or reliability by a licensed obstetrician/gynecologist. Students were given equal or the same amount of time to complete each test. There were students present at the pretest who were not present at the posttest and vice versa. A total of 111 students participated in the pretest and a total of 103 students participated in the posttest. There were two types of questions on the survey: demographic questions, 1-17 and knowledge questions 18-41.

Item Analysis

An item analysis was performed on the survey to determine how the students answered questions 18-41. From the item analysis, it was possible to determine if some questions were very easy or discriminating. A question that is very easy was identified as one when more than 50% of the students who scored in the upper and lower percentile of the survey answered the question correctly. A discriminating question was identified as when more than 50% of students who scored in the upper percentile of the survey answered incorrectly. The significant differences between the pretest and posttest scores were based on Pearson’s chi square test. If \( p < .05 \), it was assumed that the observed difference was not due to chance. For questions 18-41 the students were asked to answer: true, false or don’t know.
Question 18 stated, “The menstrual cycle occurs every 28 days in all women.” The answer is false. On the pretest, 55% answered incorrectly and 56% answered correctly for the pretest (see Table 2). Similarly, on the posttest 45% answered and 43% answered correctly (see Table 2). There was no significant difference in the pretest and posttest scores with this question (see Table 3). This question was neither very easy nor discriminating. This question requires that the student realize the presence of the word “all” because all women do not have a 28 day menstrual cycle. The calendar format as well as other graphic styles of the menstrual cycle was developed on 28 days because this is the average length of the menstrual cycle. A woman’s menstrual cycle can vary due to stress, medications, or other major life changes. The researcher also realizes that the students have some prior knowledge about the menstrual cycle and this must be considered during the presentation.

Question 19 stated, “The menstrual cycle is something that only females should understand.” This statement is false, 87% answered correctly for the pretest and 84% answered correctly for the posttest (see Table 2). This question was found to be very easy but the difference between the pretest and posttest is not significant (see Table 3). Although this question was noted as very easy, this supports the researcher’s hypothesis that all persons should understand the menstrual cycle despite gender. The researcher thinks that all persons should understand the menstrual cycle because both persons are involved during the act of intercourse which may result in pregnancy. Perhaps most think this is true but then do not act accordingly.

Question 20 stated, “Understanding the menstrual cycle will help you to prevent pregnancy.” This is a true statement. About 78% of the students who were given the
pretest agreed and 79% of students who were given the posttest agreed (see Table 2).
There was no significant difference between the pretest and posttest scores (see Table 3)
so this was also identified as an easy question. Students do seem to realize the importance
of understanding the concepts of the menstrual cycle and knowing how this information
can affect their lives directly, because there were more students who answered correctly
after the presentation.

Question 21 stated, “Menses/Menstruation may last for three to five days.” This is
a true statement, 76% answered correctly on the pretest while 80% answered correctly on
the posttest (see Table 2). There was no significant difference between the pretest and
posttest scores (see Table 3). The results from this question indicate to the researcher that
the students were aware of the length of menses; thus, this may be common knowledge
among both males and females.

Question 22 stated, “Menses/Menstruation is when the endometrial lining of the
uterus is shed and marks the first day of the menstrual cycle.” This statement is true.
Comparing the pretest and the posttest, the scores increased from 67% answering
correctly on the pretest to 92% answering correctly on the posttest (see Table 2). There is
a significant difference between the pretest and posttest scores (p = .000, see Table 3).
The students increased their knowledge on the term menses due to the significant
increase in posttest scores. This is quite remarkable, and it can be a source of many errors
in understanding the cycle.

Question 23 stated, “In the female, ovaries start producing mature eggs at the time
of puberty.” This statement is true. The answers from the pretest and posttest show that
the students have some understanding of the concept of the events occurring at puberty.
The pretest scores reflect that 57% of students agreed that the ovaries start to produce mature eggs at puberty, 14% did not agree and 28% of students did not know (see Table 2). The posttest scores indicate that 67% of students agreed that the ovaries start to produce mature eggs at puberty, 23% did not agree and 10% did not know (see Table 2). There was an increase in pretest to posttest scores of student who agreed with the statement and a decrease in the number of students who did not know the answer. This signals that the chart can be further improved. The differences in pretest and posttest scores were not significant (see Table 2).

Question 24 stated, “Ovulation is likely to occur 14 days after the first day of menses/menstruation in a 28 day cycle.” This is a true statement. The students did have some previous knowledge and there was some change in responses from pretest to posttest. This statement is correct because the time of ovulation does not vary but the length of menses may vary. At the time of pretest, 51% of students believed the statement to be true, 13% did not believe it was true and 36% did not know (see Table 2). After the presentation, the percentage of students who agreed with the statement increased to 67%, the percentage of students who did not agree increased to 19% but the students who did not know decreased to 14% (see Table 2). There is a statistically significant difference between the overall pretest and posttest scores (p = .014) (see Table 3). This indicates to the researcher that there was some knowledge gained on the concept of ovulation. The researcher can speculate that the students are now more likely to be able to determine the time that ovulation will occur and is quite encouraging.

Question 25 stated, “Ovulation is the release of the egg from the ovary”. This is a true statement. At the time of pretest 71% of students answered true, 11% answered false
and 17% did not know (see Table 2). After the presentation, 85% of students agreed with
the stated definition of ovulation, 5% did not agree and 9% did not answer (see Table 2).
Overall there was not a significant difference found between the pretest and posttest
scores (see Table 3). However, there was a demonstration of knowledge growth as there
was a decrease in students who answered false and a decrease in students who did not
know. Ovulation is a critical event during the menstrual cycle. To understand ovulation
means that the student is somewhat able to determine when pregnancy should and should
not or could or could not occur.

Question 26 stated, “After the egg is released, it may stay viable for 48 hours.”
This statement is false. The egg is viable for 24 hours after it is released from the ovary
which dictates when fertilization may occur. The viability of the egg is the reason that the
fertile days and contraceptive alert days are one to two days after ovulation. From the
pretest and posttest scores there seems to have been some difficulty with this question.
The pretest results show 42% of students did not agree with this statement, 17% did agree
with this statement and 41% of students did not know (see Table 2). After the
presentation, the posttest results show that the student’s scores worsened because 75% of
students who answered disagreed with the statement, 17% agreed with the statement and
9% did not know (see Table 2). The researcher speculates that there was some
misunderstanding with this question because the students may not be able to define viable
in terms of the egg/oocyte life span. Also, in the presentation the researcher may have
possibly changed the terminology during the explanation of the menstrual cycle diagram.

Question 27 stated, “The fertile period is the best time for a female to get
pregnant.” This statement is true. The majority of the students agreed with this statement
both on the pretest (81%) and the posttest (86%) (see Table 2). Although there is no significant difference between the pretest and posttest (see Table 3), the researcher is able to determine that students do understand the concept of fertile time. The researcher thus speculates that the student not only knows the concept but when the event occurs in the menstrual cycle as well.

Question 28 stated, “Contraception must be used at all times to prevent pregnancy.” This statement is true. The pretest results show that 60% of students agreed and 40% disagreed with the statement that contraception must be used (see Table 2). The posttest results are similar in that 66% of students agreed and 34% of students disagreed (see Table 2). The findings suggest that maybe some students thought that abstinence is a method that can prevent pregnancy not just contraceptives. Also, students may not consider condoms a form of contraception. The researcher has decided that in the future the presentation will devote more time to contraceptives including what are contraceptives and how to use them properly. Perhaps the survey question should be reworded to read: “Contraception must be used at all times when sexual contact occurs to prevent pregnancy.”

Question 29 stated, “Condoms prevent sexually transmitted diseases.” This statement is false. With this question, the researcher expected students to have a split response because there is a myth held by some young adults that with a condom you are safe from all sexually transmitted diseases. A condom only reduces the risk of transmission of sexually transmitted diseases. The pretest results indicate that 64% of students agree and 36% of students disagree (see Table 2). The posttest results were almost equally divided because 49.5% who agreed and 50.5% who disagreed (see Table
2). In the presentation, the researcher did mention that condoms do not prevent all sexually transmitted diseases. The students may not have heard the word all and also may not realize the different sexually transmitted diseases that can be spread while using a condom.

Question 30 stated, “A female may become pregnant the first time she has intercourse.” This statement is correct. The pretest scores indicate that the majority of the students (79%) agreed that this is possible and 91% of the students who took the posttest agreed (see Table 2). The researcher included this question to dispel any myths that may be present in their peer groups about the first experience with intercourse. The gains on this item were statistically significant and indicate the intervention made a difference.

Question 31 stated, “A female is unlikely to get pregnant during normal menses.” Normal menses is referring to the bleeding that occurs when a female is menstruating. Overall the student’s responses on the pretest and posttest were similar. From the pretest 41% agreed that this is an unlikely occurrence and 53% of students agreed on the posttest (see Table 3). There is no significant difference between the pretest and posttest scores (see Table 2). The researcher wanted to impart the knowledge to the student with this question that although the female may be bleeding, she could still be fertile; thus pregnancy can occur during normal menses. Women do not ovulate during their period. However, eggs may live for 24 hours and sperm may live for 5-7 days inside a woman’s body. They could finally meet up during menstruation, even though it’s rare. Plus menstrual blood can transmit HIV, so you should definitely practice safe sex during your period.
Question 32 stated, “In the male, sperm production begins at birth and continues until age 65.” This question was included to create thinking and conversation among the students about the life of the sperm and sperm production. Male sperm production begins at puberty and continues throughout their life span which contrasts with females. At birth, the female’s ovaries contain about half a million eggs. About once a month one egg is matured and released beginning at puberty and ending after menopause. However, the responses to this question were similar on the pretest and the posttest, but were unexpected. The pretest indicated that 41% of students believed that this or question 32 was a false statement, 22% believed this statement to be true and 37% of students did not know one way or the other (see Table 2). On the posttest, 48% of students believed that this was not the case, 33% of students believed this to be true and 19% of the students still did not know one way or the other (see Table 2). It is speculated that the students are possibly unclear on the proper mechanism of Viagra and other erectile dysfunction medications. The students may be under the impression that these medications also effect sperm production which causes them to believe that a male cannot produce sperm when he is over 65. In fact, babies have been conceived by men as old as 93.

Question 33 stated, “Fertilization occurs when several sperm and egg combine.” Fertilization occurs when a single sperm and a single egg combine or fuse together. On the pretest, 51% of students agreed with the statement which is incorrect and 50% of students disagreed with the statement which is correct (see Table 2). After the presentation the students’ responses changed very little, 56% of students agreed with the statement which is incorrect and 44% disagreed with the statement (see Table 2). The researcher hypothesizes that the students believed this statement to be true (the incorrect
answer) because there have been several questions from the students about how twin development occurs and if it is a genetic determined event. Students do not have a clear understanding about how twin development and may have a misconception about fertilization with respect to twinning. Also, there may be some misconceptions about fertilization in general. It is true that other sperm play a role in the fertilization process, but only one actually fertilizes the egg.

Question 34 stated, “The failure of the egg to be fertilized results in menses/menstruation.” This is a true statement. If the egg is not fertilized, the endometrial lining of the uterus that was preparing for pregnancy must be shed. The shedding of this endometrial tissue is menses. On the pretest, there were 44% of students who answered the question correctly, 24% of students answered incorrectly and 32% responded they did not know the answer (see Table 2). After the presentation, there were 62% of students who answered the question correctly, 22% answered incorrectly and 16% still did not know an answer to the question (see Table 2). Overall there was a significant increase (p = .008) in the number of students who answered correctly from the pretest to the posttest (see Table 3). As a result, the students now have a better understanding of why menses/menstruation occurs and what this event means for the female. This also familiarizes the student with the proper terminology of the menstrual cycle, which could result in the student using the terms menses or menstruation instead of period.

Question 35 stated, “Menopause is when a female stops producing eggs.” This is a true statement. On the pretest 62% of students answered agreed with this statement, 14% disagreed and 23% of students did not know the answer (see Table 2). On the
posttest 81% of students agreed with the statement and 12% did not agree and 8% did not answer (see Table 2). The difference between pretest and posttest scores was significant (p = .003) (see Table 3). The researcher has found that students believe that menopause is an aged event not a physiological occurrence. (It is speculated by students that when the student has been faced with menopause the female has been over a certain age.) The students however did use the information presented and seem to have redefined the word menopause.

Question 36 stated, “The control of the menstrual cycle is due to hormones being released from the brain.” This statement is true. The menstrual cycle is controlled by the pituitary gland of the brain. The pituitary gland releases GnRH that controls the release of FSH, LH, Estrogen, and Progesterone. On the pretest 45% of students agreed, 36% of students did not agree and 23% of students did not know (see Table 2). After the presentation, 63% of students agreed, 25% did not agree and 12% of students did not know. There is a significant difference in the overall pretest scores to posttest scores from 45% to 63% (p = .008) (see Table 2 and Table 3). This indicates that students have gained some knowledge on the hormonal control of the menstrual cycle. The student may then be able to better understand the importance of the hormones being released throughout the menstrual cycle. The researcher speculates that this information may be linked to the students understanding of hormone replacement therapy during menopause.

Question 37 stated, “Pregnancy can occur if a woman has not begun menstruation.” This is a true statement. If a female has started puberty, the necessary hormones are being released and if she has unprotected intercourse she may get pregnant. On the pretest, 47% agreed that pregnancy can occur and 53% did not agree that pregnancy can occur. The
student response was similar after the presentation 41% agreed that pregnancy can occur and 58% did not agree that pregnancy can occur (see Table 2). There was no significant difference in the pretest and posttest answers (see Table 3). The understanding of pregnancy before menstruation requires that more physiology be explained in detail to the students. The researcher will consider omitting this question, rewording the question or increasing the physiology of puberty in the presentation.

Question 38 stated, “Fertilization normally occurs inside the woman’s uterus.” The site of fertilization is located within the fallopian tubes or the oviduct. The pretest and posttest scores indicate that the majority of the students did believe that fertilization occurs in the uterus. On the pretest 83% of students answered incorrectly and 70% on the posttest (see Table 2). Although there was a decrease in the number of students’ who answered incorrectly, the decrease was not significant and does not indicate that the students gained new anatomical information about fertilization from the presentation.

Question 39 stated, “Most females are able to predict accurately when they will ovulate.” There may be a slight pain felt in the abdomen when a female ovulates but most women cannot predict ovulation accurately without charting their menstrual cycle. In order for a woman to accurately predict ovulation, she must know her personal cycle. However, 74% of students on the pretest and the posttest seem to think that a female can accurately predict when she will ovulate (see Table 2). After the woman has learned her cycle, then she can predict a range of time that she may ovulate but it is not precise. This misconception needs further attention.

Question 40 stated, “Males should not understand the physiology of the menstrual cycle.” The importance of understanding the menstrual cycle is a task that should be
shared by male and female. Even though the events occur within the female reproductive tract, the male should want to know when she is most fertile and least fertile. On the pretest, 83% of students answered that this is correctly, which is what the researcher was anticipating. However, on the posttest the number of students who answered this correctly decreased to 65% (see Table 2) and there is a statistically significant difference between the pretest and posttest (p = .003) (see Table 3). The researcher speculates that perhaps the male students realized or perceived that this was too much information, or the females realized or perceived that they alone should be responsible for knowing this information and she will inform her significant other of her status. In any case, this needs further attention.

Question 41 stated, “The life of a sperm inside the female reproductive tract is 24 hours.” Sperm are viable inside the female reproductive tract for 2-7 days, depending on the environment. The student should know this because the life of the sperm coupled with ovulation determines when pregnancy can and cannot occur. On the pretest 68% of students agreed and 33% did not agree (see Table 2). After the presentation, there was an increase in students who did not agree to 71% and a decrease in students who did agree to 33%. The difference between the pretest and posttest scores is significant (p = .000). The students did increase their knowledge on the life span of sperm. Perhaps this new knowledge will help the students in making a more informed decision about when to engage in sexual intercourse, but the percentage correct is still lower than it should be.

A comparison of the pretest and posttest answers is shown below in Table 2. The table presents the answers as percent correct and incorrect. The incorrect response
includes the students who answered incorrectly and the students who did know the answer.

Table 2. Percentage Comparison of Pretest and Posttest Answers.

<table>
<thead>
<tr>
<th>Question</th>
<th>Pretest %</th>
<th>Posttest %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Correct</td>
<td>Incorrect</td>
</tr>
<tr>
<td>18</td>
<td>45</td>
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<td>17</td>
</tr>
<tr>
<td>41</td>
<td>32</td>
<td>68</td>
</tr>
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</table>

The Pearson’s chi-square value for each question on the menstrual cycle knowledge is identified in Table 3. The answers that were statistically significant between the pretest and posttest will have a p-value less than .05. The asterisk represents
the questions whose answers were statistically significant between the pretest and posttest.

Table 3. Pearson’s chi-square test (p = <.05) Analysis of Questions 18-41.

<table>
<thead>
<tr>
<th>Question</th>
<th>Pearson’s chi-square test (p = &lt;.05)</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>35*</td>
<td>0.003</td>
</tr>
<tr>
<td>36*</td>
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</tr>
<tr>
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</tr>
<tr>
<td>41*</td>
<td>0.000</td>
</tr>
</tbody>
</table>

From data table 3, there are two groups of questions that are statistically significant. The first group includes the questions in which student knowledge increased. The questions focus on the following concepts: 22--menstruation, 24--time of ovulation, 25--definition of ovulation, 34--egg failure, 35--menopause, and 41--life of sperm. Question 22 defines menstruation for the student and their answers improved. Questions 24 and 25 both are focused on the ovulation and indicate the student has increased their knowledge on this specific concept. Students should be able to
determine when ovulation will occur when asked and this will be evaluated during the interviews. Question 34 focuses on the cause of menstruation and during this presentation the students did gain some knowledge on why menstruation actually occurs. Question 35 deals with menopause and the researcher believes that the difference here deals with the idea that menopause is age related not physiological dependent. The students were presented with information that actually defined the term menopause and in the future will not define menopause by age. Question 41 focuses on the life of the sperm and the answers indicate that the students did change their beliefs significantly on how long a sperm may survive.

The students’ answers were reversed on the second group of questions that are statistically significant. These questions focus on the following concepts: 36--hormonal control, 28--contraception usage, 31--pregnancy occurrence during menses, and 40--male understanding. Question 28 asked the student about contraception and the researcher believes that more information needs to be included in the verbal presentation which will allow students to better answer this question. Question 31 deals with the myth that pregnancy cannot occur during menses. Most persons define menses as the time when bleeding occurs and the endometrial lining is shed and this will not allow the woman to get pregnant. However, if she is menstruating but is not showing the common signs i.e. bleeding then she can become pregnant if she has a short menstrual cycle. This is another question that may require more clarification in the verbal presentation. Question 36 focuses on the hormonal control of the menstrual cycle but in this question the students reversed their answers and the researcher speculates there was a miscommunication in the verbal presentation. A design principle that is presented by Tufte and Dwyer is that the
verbal or written text must complement the graphic. In this case there seems to be a breakdown between the two that the researcher must address and correct. A similar situation occurred with question 40. Question 40 focuses on whether males should understand the menstrual cycle. The answers to question 40 also indicate there is a breakdown in the presentation because students have changed their correct answers to incorrect answers. This concerns the researcher because there is a statistically significant difference in the answers from pretest to posttest. This indicates that the students believe it is the sole responsibility of the female to understand the menstrual cycle.

**Category Comparison**

In an overall comparison of the pretest and posttest scores using a t-test (p = <.05), the mean score on the pretest was 13.22±3.43 and on the posttest the mean score was 14.98±3.24. There is a significant difference between the pretest and posttest scores of the students (p = .000). It maybe assumed that the students’ knowledge of the menstrual cycle was affected by the intervention, because their scores did increase on the posttest.

The researcher also investigated factors that may have affected the students score on the menstrual cycle knowledge survey including: gender, geographic area, childbearing, previous sex education, age and the type of diagram they were presented. The mean score on the menstrual cycle knowledge survey was 14.31±3.34 for females and 13.69±3.59 for males. The females get more questions correct than the males. However the difference between the females and males is not statistically significant. The 18% of students who changed their answers to reflect that males do not need to
understand the menstrual cycle may think that the female should know her cycle and the male’s understanding doesn’t matter.

The next factor of comparison was geographic area. Students were asked if they resided in an urban community or a rural community. According to the USDA, an urban community population is more than 2500 and a rural community population is less than 2500. The mean score for urban area students was 14.01±3.44 and for rural students 14.14±3.48. There is no statistically significant difference between the students’ scores with respect to their geographic location. This is an important finding for community college educators who serve both rural and urban students.

Students who have biological children want to be regarded as knowledgeable of the menstrual cycle. These students also think that this information is needed by the students aged 17-23. Of the total students participating in the study, 22 % of students did have biological children and 78% of students did not have biological children. According to the responses, those persons with biological children have a mean score of 15.17±2.86 and those without biological children have a mean score of 13.76±3.54. The students without children on average get one less question correct than students with biological children. The difference between the two groups is statistically significant when comparing the mean scores of correct answers (p = .013).

Another factor of interest is whether or not students have had some type of sex education throughout their lives. The students were asked to indicate which type of sex education other than school sex education they have been exposed too including: from a Couple to Couple League (sponsored by the Catholic Church)--3%, from friends or relatives--80%, from parents--58%, a private organization or agency--11%, public
organization--25%, church or other religious organization--30%. In addition, the 56% students who had received sex education at school were asked at which level they received their instruction. Instruction at the elementary level was the lowest with 28% of student receiving instruction and 55% students received instruction at the middle school level. From the research, most sex education takes place at the high school level which is evident from this study because 70% of students who received school sex education received their instruction at the high school level. Furthermore, the mean number of correct answers for students who received school sex education was 14.56±2.98 and those whom did not receive school sex education their mean was 13.41±3.90. There is a statistically significant difference between receiving school sex education (p = 0.16). Students who did not receive any school sex education on average answered one less question correct than those who had received school sex education (p = .004). Although school sex education may not be the ideal curriculum that the researcher envisions, it does present students with some valuable information that allows them to perform well on the menstrual cycle knowledge survey. It must also be considered that students have also been exposed to additional information from family, friends, public and private organizations and church affiliates.

The age factor is similar to that of those with biological children. The older students seem to take ownership of their knowledge about the menstrual cycle and they attempt to school the younger students about the myths and truths of sex education. The students were divided into four categories in an attempt to identify the age range of the community college student. The four categories and the number of students represented in each category are as follows: a) 17-21 – 50%, b) 22-26 – 25%, c) 27-30 – 8% and d)
over 30 – 15%. The largest age category was 17-21 which is similar to the trends of the current community college student because younger students are attending the community college for potential transfer of academic credits to the area universities for which they may not have been academically, financially or emotionally prepared (Levinson, 2005). The students who are over the age of 30 were the only category to have a significant difference in the number of correct answers on the menstrual cycle knowledge survey. The researcher knows that since older students have more life experiences than younger students that may also provide them with more wisdom than the younger students.

The final category of comparison is the type of diagram the students were presented. The students who were presented the calendar diagram had a mean of 14.17±3.64 and those who were presented the linear format diagram had a mean of 13.95±3.25. There is not a statistically significant difference between the types of presentation that was given.

The researcher believes that since there is a statistically significant difference between the overall pretest and posttest scores (p = .000) that the students did increase their knowledge and gain some insight about how to make informed decisions about their reproductive health. The first testing of the calendar-format diagram showed that students do equally well with it as with the traditional diagrams and often express a preference for it. If it can be improved based on the student feedback from this study, it may well prove superior in the next study.
Interview Results

From each class that was surveyed, six students volunteered for interviews--three females and three males. The students were asked questions from the interview protocol in Appendix H.

Student Profiles

Throughout the interview process, several distinctive personality traits emerged from the students. Analyzing participant backgrounds and educational experiences aided the researcher in understanding participant thinking about and biases toward sex education. All students will be referenced as Student and the number in which they were interviewed.

Student 1 was an 18-year-old male. He received some sex education instruction in high school. He was a little nervous during certain areas of the interview including the best diagram for his lifestyle and how he would share the information. He would smirk or laugh while answering and quite relieved when the interview was over. He did not add anything that was not asked by the researcher.

Student 2 was a 19-year-old female whose best friend was Student 3 also a 19-year-old female. Student 2 was reluctant when answering specifics from the linear diagram but confident in her answers when using the calendar diagram. She preferred the symbols and was all about planning her pregnancy for the future. She was also ready to share with her friends “so they don’t get pregnant when they do not want to.” Her best friend, Student 3 was a little timid and uncertain at times. Student 3 attempted to whisper her answers so that she did not get recorded if her responses were incorrect. Just as her friend, Student 2, she liked the symbols of the calendar. Student 3 shared that she has
shared this new information with her boyfriend and admitted that “… I really did not
know that there are certain days that you could really get pregnant like right after your
period. I didn’t know that…” Neither wanted to change anything about the diagram.

Student 4 was an 18-year-old male, who attended Catholic School most of his life
and had sex education since middle school. He was the most colorful of all the
interviewees, because he insisted on adding to the questions with layers of details and
explanations. He was also in search of approval from the interviewer. He even asked,
“I’m right because I do not want to make you feel like a bad teacher?” The information
presented would not apply to him directly because he stated that “I don’t think that I’m
sexually active with a girl who I don’t know, who’s not my wife without a condom.” He
was one of two interviewees that gave information about their sex lives. Student 4
forcefully requested that the calendar format be more “flashy” because “… it just has lines
in it”. When asked what was meant by “flashy”, he replied, “I don’t know ‘cause you are
a scientist and scientist is dull, sorry to say.” He even added information about the artistic
abilities of his family to help in explaining the need to create a more flashy diagram. And
yet again wanted approval when he recommended the use of a more flashy diagram and
felt that since he was so young was one of his reasons. Not a surprise, he was not eager
for the interview to end and even asked for clarification on some questions from the
menstrual cycle knowledge survey. The questions that he needed clarification focused on
menstruation, contraception and pregnancy during menstruation.

Student 5 was a 31-year-old female who attended public school in Texas. Texas
was mentioned because it is one of the most progressive states on sex education in the
school system. She was however, unsure about the exact days that pregnancy is most
likely to occur or not occur. By her working in a bar, she stated that she would share this new information with all the girls at her job.

Student 6 was a 20-year-old male who has not received in sex education in schools; he attended public schools in Louisiana. When he responded to the time of pregnancy and was not sure, he explicitly stated “that was a guess, honestly”. In class he seemed very shy but opened up throughout the interview. He wanted more than one copy of the diagram to share with his friends because he said, “I have a friend who is a sex addict; I got another friend who is a male whore.” At least the information was given to his peer group and they were informed. Student 6 was the only student who suggested that all three diagrams from the menstrual cycle knowledge survey be shown to the students because “this one may be easier for someone else.” He was also curious about when he would receive his free gift card that was an incentive for participating in the interview.

Students 7 and 8 were interviewed together. Student 7 was a 22-year-old expectant mother and Student 8 was a 30-year-old female with children. Student 7 was directly involved in a Couple to Couple League for fertility counseling. She was very adamant about knowing and charting your cycle and how the calendar she used was similar to the calendar shown in the presentation. She knew the proper terminology for the events of the cycle and likes the symbols as well. She stated how she shared this information along with the information from the Couple to Couple League with her best friend who was getting married soon. Student 8 was not as forceful about the cycle charting as Student 7 but did indicate several times that it is important to know your personal cycle. She planned to share this information with her daughters so that when
they are ready, they can make informed decisions. Both Student 7 and 8 requested a 
change to the diagram that was indicative of their interview – you have to know your 
cycle and that the calendar is not 100% correct unless you know your cycle.

Student 9 was a 41-year-old female. She was not eager to talk but wanted the gift 
card. Her answers were straight forward without any side commentary. The one thing she 
mentioned was about the life of the sperm. She indicated that she had no clue that sperm 
actually live that long inside the female reproductive tract.

Student 10 was a 19-year-old male. He was a little anxious at first because the 
recorder was there but once he was assured that no one would hear the interview, he 
relaxed. [He was the positive reinforcement of the calendar format as he stated that the 
calendar “could be both ways”.] He wanted people to use it for pregnancy prevention 
and natural family planning. He even mentioned that the calendar did not frown on the 
behavior of sex but gave you information that you may need “if you choose to do it”. 
Student 10 was a prime example of the advocate for the teen and the couple that was 
trying to get pregnant.

The next interview group consisted of students 11, 12, 13, and 14. These students 
were interviewed together because they thought it was more fun that way and they were 
also all in the same lab group. Students 11, 13 and 14 were 18-year-old females and 
Student 12 was a 20-year-old male. They applied the presentation and diagrams to their 
lives and how they planned to become better because of this new information. Student 12 
wanted an interactive website that his sister who was trying to get pregnant could use. He 
had already begun to share this information with someone and was ready for the next
part. Overall the group agreed that this was good information for their friends now to prevent pregnancy and great information for later when they wanted to get pregnant.

Student 15 was a 39-year-old female who desperately wants to have children. She knew the events of the cycle on both diagrams by name but was a bit shaky on the proper terminology to describe the events. She shared this with everyone that she knows and wanted to know more about her specific situation. It was recommended that she talk to her physician for further details and advice. Her responses about both diagrams were similar to the other students who were interviewed because she did not like the linear diagram but did like the calendar because of the symbols.

Student 16 was a 21-year-old female who has had some sex education in high school. In addition to the information from the presentation and the diagrams, she mentioned information about how during days 11-15 “in society and in movies they say ‘she is ready’”. She was also interested in helping teens and planned to communicate this information with them.

Student 17 was a 35-year-old female who had a partial hysterectomy and has 2 children. She insisted that the information was not practical enough for today’s society. She preferred the linear format because of its style and planned to share the calendar format with her daughter. She eagerly mentioned that “reproduction for me is a done deal”.

Student 18 was a 48-year-old male who was eager to get involved in the interview with the younger students. He remembered being involved in sex education while in middle school and that it was co-ed. He did like the details of the linear format and enjoys the smiley faces that are used on the calendar to indicate safe intercourse days. As with
student 17, he stated, “ummm, no longer in reproductive mode” so he cannot apply this to his personal life. He provided extensive suggestions for the calendar format and this will be discussed in detail later.

Student 19 was a 21-year-old female who has been involved in sex education from elementary school to high school. She liked the symbols in the calendar format and informed her peers of this new information. She was one of the few who actually stated that the calendar format should be added to school sex education classes.

Student 20 was a 26-year-old male who was very figidity but was also this way in class. He was ready to get to the end before it even begins. He provided very safe answers as to not imply that he was sexually active. He liked the symbols and suggested that the symbols be re-evaluated so that the calendar can be used widely.

Student 21 was a 35-year-old female who has not had any sex education in school. She desired to get pregnant so her answers were based on the fertile days. She had shared the information with her husband because she said, “it was important for him to understand as well.” This statement would have definitely been appreciated by Student 7 because she felt the same that her husband had to understand and that was how they got pregnant with the child.

Student 22 was a 25-year-old female who did not include any side comments. She answered the question very clear about what worked for her. She suggested that men should know too, “so they do not always try to place the blame on the girls because they should both be blamed, not just her.” She did say she will be more careful now and pay attention to her body.
Student 23 was a 65-year-old grandmother who volunteered to add experience to the data. She recalled being involved in sex education at the Catholic Church before she was married. In her responses, she prided herself on her age. She stated, “It was good for younger people. They were given more information about their bodies and how to keep themselves from becoming pregnant.” Just as with the other students whom this did not affect personally, she was open enough to realize that someone needed this information. She indicated that this diagram will help her to answer questions from her granddaughters and that she will tell their mothers so they can also answer any questions that the girls may ask.

Student 24 was a 31-year-old female who was not able to have children. She preferred the linear diagram because it had more details for understanding the menstrual cycle. She was unsure that she would share with her peers but thought “it may be helpful with younger family members.”

Student 25 was a 29-year-old female who has a 13-year-old stepdaughter. She appreciated the presentation because now she can calculate her fertile time. This information was necessary because she wants to try to get pregnant within the next six months. She planned to share her information with her fiancé so when they do try, he can know what is going on. She was definitely a planner and her planning skills would be appreciated by the other moms and future moms.

Student 26 was a 19-year-old female who was concerned about her friends who have children. She implied that having a child for her right now was too much drama. The drama was related to the things she saw that her friends have to deal with because they have children. She was ready to tell her other friends without children how to be
careful. She was not too nervous but seemed as if she wanted more time with the interviewer. She was eager to discuss but tried to remain in a box that limited her conversation.

Student 27 was a 19-year-old male who thought that girls should know this better than boys. He agreed that a boy should know too. He was a little frustrated when talking about how girls attempted to trap you in a relationship with them by getting pregnant. The researcher was not too surprised because she had seen this type of anger before by a young man who was going through a paternity issue. Student 27 wanted everybody to know about the calendar. Not to the researcher’s surprise, he wanted to know when he can have intercourse and not get the girl pregnant but I am not sure he likes planning extensively. He seems to be genuinely interested, in that he wants this information to become readily available so boys can watch out for themselves.

Student 28 was a 20-year-old male who was very trusting of the girls he decided to get involved with. He assured the researcher that “the girl will be honest with me about where she is on the calendar.” He is one of the few who indicates that he had never received this much instruction on how to not get a girl pregnant by knowing the calendar. Sharing for him is important because he just as with the other male students must tell their friends. His most important thing that he will share is the “fun days” and the life of sperm. When speaking of the life of sperm, it was evident by his facial expressions that this was new information to him that no one had ever told him and he, just as with other male students, must tell his friends.

Student 29 was a 23-year-old male who was planning to use the calendar as a way to start conversations with girls. He planned to let them know that he understands how
things work and this will let the girl know he cares. The researcher was surprised that a student would use this information to entice females but did realize it was clever and hopes it may help to prevent an unwanted pregnancy. He even asked for extras so he would have them when needed. With all smiles, he asked that the researcher not let any girls on to his new plan.

Student 30 was a 21-year-old male who informed the researcher that his sex education came from his friends. He did, later on in the interview say that his friends were wrong about some information and that he planned to inform them of what they needed to change. This student planned to put together what he termed “the right stuff” from his friends and the right stuff from the presentation to make sure he can control the situation because he will know as much as the girl. He was very thankful for the new information that will keep him from having children before he is ready.

The student profiles allowed the researcher to note some themes among student age and life experiences. The students can be grouped into several categories: the college students, the parents and future parents, and the others. The students are categorized by their uses of the information presented to them. The college students are students who are very concerned about not getting pregnant and include students 1, 2, 3, 4, 6, 10, 11, 12, 13, 14, 16, 18, 19, 26, 27, 28, 29 and 30. Within the college students, there were the shy girls, and the typical boys. The shy girls would not let it seem as if they were involved in any type of sexual behavior. The shy girls insisted that they are using this for planning in the future and that is all. On the other hand, the typical boys were ready to try this out and even ready to use it to entice girls. The typical boys were not afraid to share their uses for the information and asked for more information for their friends. They were
straightforward in stating that the symbols are what keep their attention; some specific answers will be discussed later in the Student Response section of the paper.

The parents are students who are currently parents, grandparents or want to be parents. This category included students 5, 7, 8, 15, 17, 23, and 25. For most in this category, the students were parents who were ready to share the information with their children and grandchildren. They realized that this was an important issue for their children and grandchildren and now seemed ready to handle the task of explaining the menstrual cycle to them. Several students expressed that this calendar will be used to aid their planning for pregnancy within the six months or so. There was one student in this group who repeatedly stated that “charting your cycle is the best way to go;” she is definitely an advocate for natural family planning.

The others are a category of students who for various reasons were a bit indifferent to the information. These were students 9, 18, 20, 21 and 24. Two of them were older so they felt they were past this stage in their lives and really did not have anyone to share the information with. One student had special circumstances in which she can no longer have children and then the others of this category were just unconcerned. However, the most suggestions for the calendar format were from a student in this category. This may help the researcher to better develop the calendar from all perspectives.

In the interview process, there were two instances when students were interviewed together. Students 7 and 8 were interviewed together and the interview went very well because as they spoke, they were feeding off of each other for more detailed responses. The researcher does not think a solo interview for these two would have been
as effective because of the valuable information that was obtained from them as a pair. The second instance was the interview of students 11, 12, 13, and 14. As stated previously, these students wanted to be interviewed as a group and more than likely do many things as a group. The dynamics of this group were a little different than that of 7 and 8 because they did not feed off each other as much and were attempting to be a little different than the person immediately before them. With this group, the researcher thinks that the interview may have been a little different if conducted, one-on-one, but then again, the relationship with this group is as a group. The differences in dynamics also have to do with age and life experience. Students 7 and 8 were either a soon-to-be parent or were already a parent whereas as students 11, 12, 13, and 14 were in the college student’s category and not ready for any children at this stage in their lives. The individual responses to the interview questions are listed and analyzed next.

**Student Responses**

As stated previously, the students were asked questions from the interview protocol listed in Appendix H. The interview questions will be broken down and some responses from the students will be included to demonstrate the connections with the themes that have emerged from the interview process.

Demographically, the students interviewed ranged in age from 18-65. At times when age was asked, there was a short pause with some of the older students. However, during the interviews they became more comfortable with the interviewer and even realized that they were needed to add a new dimension to the data being collected. The emotions of the students are included to illustrate the comfort of discussing this topic
with the researcher. Sex education is typically a taboo subject that most students do not like to discuss until they realize that it is just biology.

When students were asked, “Have you had any type of sex education? And if so when and where? Was it same-sex school environments or co-ed environments?” The responses varied from “No” to “Yes, elementary school and/or middle school and/or high school” to “Yes, at a Precana Conference at the Catholic Church before I was married at age 18.” Student 5 even had co-ed sex education in a public school in Texas. The students from the Louisiana school systems were in same sex environments when they were asked about their sex education classes despite grade level. There was also one student, Student 7, who had been involved in a Couple to Couple League, natural family planning method supported by the Catholic Church, and was glad to share her experiences. The sex education question was the lead in to get the students to open up and be ready to discuss the other questions.

After the students identified the diagram that was presented in their class, they were asked to use that diagram and determine when pregnancy should or should not occur. Students who were presented the linear format appeared to the researcher to be more hesitant that students who had been shown the calendar format. Students 1, 3 and 6 were presented the linear first and Students 10, 11 and 21 the calendar first.

Researcher Using this diagram, show me where pregnancy is most likely to occur and why during that time?

Student 1 Ummm, right here, ovulation.

Student 3 Ummm, right here (as she pointed to ovulation) but I don’t really know.
Student 6: I say (pauses) this time? (luteal phase) That was a guess, honestly.

Student 10: The red triangles mean you have a small chance of getting pregnant and these were the larger chances (male/female symbols).

Student 11: Days 7-15 because contraception alert and fertile days.

Student 21: Days 7-16 because the legend says contraceptive alert.

The differences in how the students answered were due to the ability to recall the information from the presentation, as well as using the legend or symbols on the calendar format.

After being asked about pregnancy occurring, the students were asked about the time of the cycle that pregnancy should not occur. Similarly to the responses from the previous questions there was a pause or uncertainty in answers from students who were presented the linear format first compared to students who were presented the calendar format first. Students 5, 6 and 15 were presented the linear format first and Students 11, 12, 13, 14 and 17 were presented the calendar format first.

Researcher: Using this diagram, when is pregnancy most likely to not occur?

Student 5: Days 22-27 I think because that was when everything was the lowest, I was going by that (hormone levels). Ummm, I can’t read this chart well.

Student 6: Not sure.

Student 15: Uhhh, the only thing I remember is when you said after the cycle starts over again? So I am going to say this area (the hormonal panel of the linear diagram),

Students 11-14 Smiley faces!
Student 17  During the time right after your period.

Student 18  When the smiley faces are there, I used the legend.

The calendar format students are using the symbols and the legend to help them identify the events of the cycle whereas the linear format students are having a little difficulty in defining the event’s occurrence.

After being asked about the events of the cycle, the students were asked for more details on the diagram of their choice and its effectiveness. The male students were straightforward in their commentary and kept their answers simple.

Researcher  Which diagram is better for your reproductive lifestyle and why?

Student 1  The calendar because it is easy to read.

Student 4  The calendar because it seems simple, just looking at it seems like anybody can get it.

Student 10 The calendar because it tells both sides and no fingers are being pointed at you.

Student 20 The calendar is very user friendly. This one (linear) is more specific but still viable.

The female students were more detailed and wanted to mention what exactly would help them about the diagrams.

Researcher  Which diagram is better for your reproductive lifestyle and why?

Student 2  The calendar ‘cause like it has little symbols and lets you know like when you are on your period and when you can have fun and when you are fertile.

Student 3  The calendar ‘cause like it shows when you are on your cycle and
that shows like the most hazardous days (red triangles) and the most happy days (smiley faces).

Student 11 I think the calendar is easy to read than the other one…

Student 39 I think it (calendar) is much more helpful because of the pictures and easier to follow color coordination.

Student 17 To me the linear is easier to understand because of the panels.

The calendar seems not too practical for today’s society and lifestyles and preferences.

The two emergent themes for students’ choices to use a specific diagram for their lifestyle were reading ease and understanding. Both male and female students responded that the symbols on the calendar format help them to remember the events of the cycle.

Now that the students have chosen their preferred diagram, the researcher wanted to know how this new information would affect their lives. For these questions, there was a wide range of responses depending on their age and current life status.

Researcher How will this presentation/diagram affect your future reproductive health decisions?

Student 1 Ummm, ummmm me personally I always strap up so I understand it more as far as some girls play with you about this and I will be more comfortable with situation.

Student 3 See I didn’t know that there were certain days that you could get pregnant, I know that there was a chance all the time but it’ll help me plan like when I do plan to have children, I know which days are best to try and conceive.
Student 11: I think that later on when I want to have kids, I can plan when I want and I do have like friends who have gotten pregnant and didn’t want to get pregnant so they could have you that to know when to and when not to have sex.

Student 18: Ummm, no longer in reproductive mode!

Student 21: I will use this knowledge when trying to conceive. It will help me know which days are fertile and are more likely to conceive.

Student 23: I no longer have to worry about reproductive health, but it will certainly be useful in answering the many questions that I am faced with daily from my 12, 14 and 18 year old granddaughters.

For the most part, the females wanted to use the calendar for planning for the future and the guys would like to not impregnate a female. There were some responses that informed the researcher that although this may not affect them directly, they will use it to help others to make informed decisions.

The students were then asked to discuss with the researcher whom they would share this information. The dissemination of this knowledge will help to dispel myths about pregnancy within their peer groups, among their families and even with their co-workers.

Researcher: Do you think you will share this information with anyone?

Student 3: Yeah with my boyfriend.

Student 6: Yes because my friends need to know this!

Student 7: I told my best friend who is getting married and uh they never had
sex so she is trying to see what kind of birth control to use and I have recommended the chart to her and stated that you should do this, you should do this, like and if you choose not that is fine and I got pregnant with my first daughter on birth control.

Student 8 I would probably share this with my teenage daughters whenever they come to me and say they are ready to do this, and I would sit down with them and convince them to not to do, but if they want to do it to use protection or use the diagram that as a precaution too.

Student 10 I told some people that the safest time is right before

Student 12 Like I was saying earlier, it is great guide to let people know when they get married they will know when to and when to avoid it and then later on when it is time you know when to start.

Student 14 I have friends that have had pregnancy scares and they never know and this would help to not have a scare and prevent like you said unwanted pregnancies.

Student 23 As I mentioned before, I will talk to my young granddaughters about this. All young girls should be informed, at an early age, of the chances of becoming pregnant. I will also show it to their mothers so they can have good information in advising their daughters of the possibility of becoming pregnant.

Overall, the students were eager to share the new information. From their verbal responses and behavior, the researcher was able to determine that the students were grateful for the information that was presented. Their responses also indicated to the
researcher that pregnancy is an issue for students whether it is in their personal lives or a topic of discussion in their peer groups or with their families.

The final question that the researcher asked was for suggestions about the diagram or presentation. The researcher wanted to know exactly how the students viewed the diagrams and what was their input if any to make it better.

**Researcher**  Is there anything that you would like to change or add to the diagrams or presentation?

**Student 4**  You need to make it flashy! It’s just lines.

**Student 8**  Somewhere on here you need to put on here that you need to know your cycle.

**Student 12**  It covers all bases but the ability to set it to an individual would be nice.

**Student 14**  I don’t see anything that you need to change either, because it gives details that you actually understand.

**Student 18**  Yes, color code menstruation days to red instead of black for blood, so no bias because some may not see it as a dark time…. and…. Make safe days black and white for same reason, no bias… oh and use yellow or orange for the alert days, like a caution sign.

**Student 20**  For the safe intercourse days perhaps another symbol would be better for widespread use.

The few suggestions that the students provided the researcher are simple enough and could be implemented to reflect the changes before any further printing or distribution of the diagram. Also, by asking the students’ opinion of the diagram and the
presentation, it allowed the students to feel as if they have a direct role in changing how the information is presented after their interaction.

Overall, the interviews were proven to aid the researcher in determining the importance of this topic at the community college. The effect that the presentation and diagram will have on the students will be everlasting because each student has their personal copy of the diagram. It was also important to allow the side commentary from the students because this may have been the only time that the student was allowed to discuss reproductive health issues.

The categories that were developed from these interviews include: sex education instruction, differences between which diagram was presented first, symbols and legend, reading ease, sharing of information, suggestions. First with sex education, the earlier instruction they received did not seem to affect the type of response that was given by the students. The students who had previous sex education did not appear to know any more that the students without sex instruction. However, on the knowledge survey there was a statistically significant difference (p = 0.16) between the students who had some sex education and the students whom did no have any sex education (See Table 3). In addition the students who did not receive any education on average answered one less question correct than those who had received school sex education (p = .004). Secondly, there was a pause in the responses from the students who were presented the linear diagram first compared to the calendar first students. The theme of the symbols and the presence of the legend are what allowed the calendar first group to answer with confidence.
This theme was also important with respect to the reading ease category and the sharing of information category. The ability for students to easily follow new concepts and apply them to their daily lives is one aspect of human constructivism—meaningful learning. The student appears to have created a new neuronal network for pregnancy prevention or family planning that is triggered by the symbols that are present in the calendar format. The topic that was presented to the students has also been found to be one that is important in some area of their lives. Students want to know and learn about topics that affect them and are more likely to store this knowledge into long-term memory (Friemuth & Quinn, 2004; Sousa, 2001; Zull, 2002). The students’ responses reflect this because some students stated that they would not be applying this to their lives directly but sharing the information with others. Mostly the females, and a couple of males, stated that they would use this information later in life when they are ready to planning for a family and this informed the researcher that the information may get stored in their long-term memory.

**Researcher’s Reflections**

The interview with each student was an experience that will be everlasting in the researcher’s mind. The ability to discuss an original work with the persons that this information will impact was phenomenal and then to be told that the work was appreciated was even better. However, the researcher though that some students were a little hesitant to participate in the interview process in fear that they would be asked about their personal sexual behavior and experience. The researcher was not sure how to ensure students to understand that this is not the case because one administrator had to be convinced that the researcher was not promoting premarital sexual behavior among the
students. There was not a problem interviewing the students who were currently registered in the researcher’s course but the students who were not registered in her course was where the problems presented themselves.

The students who had a previous relationship with the researcher seemed to have been searching for approval when answering some of the questions. These students however did open up easier than others. The reason was the openness of the conversation in the researcher’s class about reproduction and how it is just another biology topic that happens to have a personal interest for some. The ability to convey to the students that this topic is just science and that the researcher is not afraid to answer any questions no matter how graphic had an effect on the students’ openness.

The researcher found this to be true because when she attended other classes and only gave the presentation, few students asked questions. Then after she left, the instructors of the other classes were bombarded with the “sex” questions. One instructor even suggested that the researcher come in every semester to present this topic and other related topics because she hated to talk about this with students! With the lack of teaching ease and taboo that society has placed on the topic, the researcher could possibly create a similar environment when discussing this topic and related events in the future. Surprisingly, most students did not need an incentive to participate; they just wanted to be a part of research, but after some convincing, all the students did accept the gift cards to local fast food restaurants.

The results from the survey and the interviews indicated that there was some knowledge gained by the students from the presentation and the diagrams. There are some areas that need further research and some areas that must be expanded within the
presentation. The calendar format diagram was preferred by some students because of the symbols that are located on the calendar. The students who did not prefer the calendar format however, indicated that they would share the information with others. Therefore, the information from the presentation will be discussed in the participants peer groups, families and among co-workers in hopes to dispel myths about the menstrual cycle as well as to influence future decisions about their reproductive health.
CHAPTER 5

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Summary

This study focused on understanding the menstrual cycle diagram and related concepts. The menstrual cycle diagram was presented in two different formats, a linear format and a calendar format. The linear format is the traditional format presented to students in a sex education setting. The calendar format was designed by the researcher and includes unique symbols and emphasized events. The students were given a pretest to determine their knowledge about the menstrual cycle and then a presentation was given using either the linear format diagram (see Appendix C) or the calendar format diagram (see Appendix A). After the presentation, students were administered a posttest which was identical to the pretest and it evaluated their knowledge after the presentation in their courses.

The researcher developed the calendar format diagram in an attempt to address some misconceptions that were evident in past students. The calendar format diagram uses several unique symbols and explanations to simplify the events of the menstrual cycle. A black box represents the menses, which occurs days 1-7. A red triangle and male/female symbol represent “contraceptive alert” days (7-16) and fertile days (11-15) to indicate the days when contraception should be used to prevent pregnancy and the fertile days for a couple planning for a pregnancy. A smiley face emoticon represents “safe intercourse days,” indicating to the student that a pregnancy is not likely if ovulation has occurred and the female knows her menstrual cycle. There are also colored lines representing the phases of the menstrual cycle. A green line denotes the follicular
phase where follicles are developed and estrogen peaks, while FSH and LH are increasing. The lining of the uterus is sloughed off at the beginning of this phase and begins to renew at the end of this phase. A yellow line denotes the ovulatory phase indicating the follicle has ruptured and released an oocyte, estrogen decreases, there is an LH surge, and FSH increases. The uterine lining thickens. A purple line denotes the luteal phase indicating that the ruptured follicle becomes a corpus luteum which secretes progesterone. The uterine lining continues to thicken. The calendar format presents the menstrual cycle diagram as a continuous cycle, one of several graphic design principles of Edward Tufte.

The researcher, along with a practicing obstetrician/gynecologist, created the menstrual cycle knowledge survey (see Appendix C) and the text to accompany the calendar-format diagram (see Appendix B). The menstrual cycle knowledge survey was administered as the pretest and posttest for this study. The survey asked several demographic questions including gender, age, existence of biological children, and type of community in which the respondent resides. Then, the students were asked about their prior sex education--if any, and when they were presented this information. The second section of the survey asked the students true or false questions about various concepts of the menstrual cycle diagram. Some of the concepts included menses/menstruation, ovulation, fertilization and pregnancy. Other related concepts included contraception, menopause, and life of sperm.

Six students from each course, three females and three males, were interviewed after the posttest on their opinions of the menstrual cycle diagram presentation. The younger students, age 17-23, were more receptive to the calendar format because it was
easy to read and the symbols helped them to remember the events of the menstrual cycle. The older students were not partial to either diagram, but were willing to share the information that they had learned with others and thought that it was a valuable presentation.

Conclusions

This research was centered on one main question and two subquestions. The answers to these questions are as follows:

Main Question

How do modifications of the menstrual cycle diagram influence selected community college students’ scientific understanding of human reproduction?

The modifications of the diagram included a change in overall diagram format of the menstrual cycle diagram-a calendar format. It was assumed to be easier to build upon students’ prior knowledge of how calendars work. The calendar format included symbols within the calendar that were identical to the symbols in the legend. The ability for the student to recognize identical symbols in the graphic and the legend illustrates Edward Tufte’s design principle of economy of perception (1990). The calendar format also included new terminology developed by the researcher including contraceptive alert days and safe intercourse days.

The Community college students’ scientific understanding of human reproduction was influenced by the modifications of the menstrual cycle diagram. This influence was evident during the interviews of students who participated in this study. The students were able to identify events of the cycle when asked and some used the symbols to assist them in framing their responses. The students stated that the symbols helped them to
understand what was actually occurring at specific times, and that they were able to understand the reason you should not have intercourse the first two weeks after menses/menstruation. The students also stated that they were not aware that there are specific times that pregnancy could and could not occur during the cycle. In addition, the students who were ready to plan their families were also influenced by the modifications of the menstrual cycle diagram. These students were planning to use the calendar format for natural family planning, by charting their cycles and being able to predict their fertile days.

Additional subquestions were to evaluate the differences between the modified menstrual cycle diagram and the original diagram:

1. What difference in scientific understanding results from studying human reproduction with a layered-linear type menstrual cycle diagram, as opposed to a content-equivalent calendar type menstrual cycle diagram?

From the test scores there was no significant difference detected between the layered-linear menstrual cycle diagram as opposed to a content-equivalent calendar type menstrual cycle diagram. However, when interviewed students expressed more difficulty overall with the layered-linear format menstrual cycle diagram as opposed to the content-equivalent calendar type menstrual cycle diagram when asked to identify events of the menstrual cycle. Most students expressed concerns that the layered-linear type menstrual cycle diagram included too many details for their lifestyles, and they would like the information to be student friendly and easy to understand. The other difference was the inclusion of the symbols on the content-equivalent calendar format menstrual cycle diagram, which allowed the students to use symbols to recall and identify the events of
the menstrual cycle. The older students, who were in less relevant life stages, were not partial to either diagram.

2. Which graphic design, given the variety that exists for each of the two diagrams types, appears to be optimal for maximizing scientific understanding and the ability to use scientific information personally?

The graphic design that was optimal for the students’ scientific understanding appears dependent on the students’ ability to use scientific information personally (application of information). Younger students understanding and application of this information was maximized by using the calendar type diagram because the details are clear and concise, with symbols representing the events of the cycle. The younger students were able to transfer the information to their peers using the terminology of the calendar type diagram, and then explain to them, scientifically, the events that are occurring during the menstrual cycle. The students who were planning for a pregnancy later in their lives, as well as those who were planning for pregnancy within the next six months to a year maximized the use of this scientific information to their personal lives by using the calendar type diagram to chart their menstrual cycles and predict their fertile days. The older students, depending on their gender were able to increase their hormonal knowledge with the linear format menstrual cycle diagram and increase their practical knowledge with the calendar format menstrual cycle diagram. The older female students wanted to understand the hormonal levels and other physiological concepts that were occurring during their menstrual cycles or cause of the cessation of menstrual cycles. Thus, the layered-linear type menstrual diagram allows them to maximize their scientific understanding. On the other hand, the content-equivalent calendar type allows the
students to apply this scientific information to the lives of their children, grandchildren, or others that they may come in contact with whom they believe should understand how to prevent an unwanted pregnancy. The older male students were not partial to either type diagram of the menstrual cycle. Therefore, those students’ understanding was served by both graphics, depending on their current life status.

The limitations of the study included using only community college biology students and limited, non-random sample size. The use of community college students restricts the generalization of this study’s findings to other college students. In addition, the students studied were biology students and students not in other courses. All students should also be able to make informed decisions about their reproductive health. The interviews also limited the study because students who volunteered may have been more outspoken or atypical of those who did not volunteer. Another limitation of the interviews was interviewing students in a group. The answers during this interview session may have been skewed because the students were awaiting approval of their peers and would only reply in the same manner that the persons before them replied. Also, the use of a mixed gender group may have affected the responses of the students within this group.

**Implications**

The results of this research imply that the sex education is important in the community college environment. The students’ acceptance of the information and willingness to share this information with others indicates that this reproductive health knowledge, as well as additional reproductive health knowledge, is desired and needed. This implication also suggests how the research may be expanded to increase their reproductive health knowledge. First, the development of an interactive website with the
calendar format menstrual cycle diagram would allow students to personalize the
calendar and accurately chart their cycles. Several students requested this information and
wanted to recommend the website to their friends and family members. The students
thought that they would be able to better predict the events of their menstrual cycle or
that of their mate. Secondly, the students’ comments warrant expansion of the
presentation to include more information on contraception, information on STIs,
information on HIV/AIDS and information on other reproductive health related areas.
This expansion requires that a more detailed survey be designed and administered to
determine the information that students know, don’t know, and desire and what depth is
needed.

The students who participated in this menstrual cycle study have been provided
with scientifically accurate information through graphics and an illustrated verbal
representation. The students were given a copy of the content-equivalent calendar type
diagram to share with their peer groups and families. Overall, the students who
participated in this study should be able to make informed decisions about their
reproductive health in the future. Only time will tell as their lives unfold.

A Suggested Line of Research

To build upon this exploratory study’s experiences and findings, the researcher
suggests that a series of studies of community college students understanding of sexual
reproduction and the continued improvement of the calendar be conducted. The first in
this series of studies will be to investigate the problem areas from this study. The
researcher will explain the following in the presentation a) the viability of the egg and its
importance, b) the basics of contraception, and c) the mechanisms of contraception. A
similar sample size will be used to introduce the new additions to the presentation. The researcher will also include a fact sheet about these topics as well as other topics covered in the presentation in hopes that the students use this information as a review tool before the posttest and as a tool to distribute this new information. Since these areas are being reintroduced with more detail into the presentation, the researcher must also reevaluate the pretest and posttest for clarity before administration to the students. A reproductive health expert will review the materials before it is administered to the students. Analysis for the new study will be similar to this study and will compare the differences in the new questions and old questions to determine if there was some knowledge gain after the new material was changed.

The second study that will be investigated is the use of an interactive web site containing the information from the presentation. The interactive web site will include the calendar-format menstrual cycle diagram. Research will be conducted to determine which of the websites at the time possess the best format for students to input their personal information to receive an accurate prediction for their menstrual cycle. The information presented to the students will link the symbols and terminology that was developed by the researcher. Also, when using a search engine this new website will be found when searching for information on pregnancy prevention, sexually transmitted infections and fertility. The web site will also include a pretest before they can begin using the interactive calendar. This pretest will ask the students general questions about the menstrual cycle and also reproductive health. The site will first be used in biology lab courses to determine if there are any concerns about the site’s design and content. In
addition, students will be asked to suggest other areas of reproductive health that they would like to see discussed on the web site.

The third stage in expanding this study is to include more information on reproductive health. This new information will be an additional presentation to the menstrual cycle diagram. The results of the survey from the web site will drive the topics that are discussed at the community college because the students will be the ones deciding what will be discussed and in how much depth. Developing this new information requires that a new knowledge survey be developed. The questions for this new knowledge survey will be based on the 24-item version of the Miller-Fisk Sexual Knowledge Questionnaire and other sexuality-related measures (Davis, C., Yarber, Bauserman, Schreer and Davis, S., 1998). These students will be administered a pretest and a posttest on sexual knowledge. The students will be allowed to use the interactive web site. They will be provided with a fact sheet or brochure of some sort with the basics of each topic for quick reference.

The researcher is in hopes that the information learned from these new studies will be used to develop a reproductive health course at the community college. The course would include all presentations and the interactive web site. The students would also be exposed to guest lectures on the topics being covered in the course. The development of this course allows more information about reproductive health to be transmitted into the community college. The more scientifically accurate information that is disseminated to the students, the more students become aware about their reproductive health, thus the more informed decisions that can be made.
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## Menstrual Cycle Calendar for Pregnancy Prevention or Natural Family Planning

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<td>🟢</td>
<td>🟢</td>
<td>🟢</td>
<td>🟢</td>
</tr>
</tbody>
</table>

### Events of the Cycle

- 🟢 = Menstruation: The lining of the uterus is sloughed off and expelled through the vagina. May last from 3-7 days.
- 🟢 = Conception:仍需确认
- 🟢 = Fertile Days: Ovulation occurs 14 days after the first day of menstruation. Fertile days can be 3 days before and 2 days after ovulation because sperm can survive for 3 days and the ovum may be viable for up to 24 hours after ovulation. The fertile days are also considered fertile due to the ovary being released.
- 🟢 = Self-Incorporation: Ovulation has occurred and the corpus luteum begins to develop. Therefore, pregnancy should not occur. Conception is still recommended.
- 🟢 = Fertilization: Developing ovum, uterus begins to form. The egg begins to mature. It becomes a blastocyst. Fertilization may now occur.
- 🟢 = Ovulatory Phase: The fertilized ovum travels to the uterus. It begins to form the corpus luteum. The egg begins to mature. It becomes a blastocyst. Fertilization may now occur.
- 🟢 = Luteal Phase: The corpus luteum forms, which secretes progesterone. Vaginal lining continues to thicken.

©2007fmmw
APPENDIX B

TEXT TO ACCOMPANY MENSTRUAL CYCLE CALENDAR

When a female reaches puberty, her body releases hormones which prepare for pregnancy. The hormonal changes occur monthly and are to be somewhat predictable if the female knows her body. If a female has a normal 28 day cycle she may follow this calendar but if her cycle is different she will have to learn her cycle first, and then begin using the calendar. Stress, medications, illnesses and even genetics might cause a female to have irregular cycles. The events of the cycle include menstruation, “contraception alert”, fertile days, safe intercourse days, follicular phase, ovulatory phase and luteal phase. Menstruation occurs during days 1-6. At this time the endometrial lining of the uterus is sloughed off and expelled through the vagina. This is the beginning of the follicular phase. Follicle development begins and estrogen hormone levels are low but begin to increase causing the endometrial lining to renew. As the endometrial lining begins to renew and hormone levels increase, days 7-10 are viewed as “contraception alert” days because the sperm may still be viable when the oocyte is released on day 14. Days 11-15 are considered the fertile days because ovulation occurs on day 14 and fertile days can be 3 days before and 2 days after depending on the life of the sperm. Therefore, for pregnancy prevention these days are not recommended for intercourse. Just before the fertile period, estrogen peaks. This peak causes an LH surge and an increase in FSH, which is referred to as the ovulatory phase. Also at this time the endometrial lining thickens as it prepares the uterus for implantation of a fertilized egg. Day 16 is the last “contraception alert” day of the current cycle and marks the beginning of the luteal

110
phase-days 15-27. The ruptured follicle becomes a corpus luteum which secretes progesterone in addition to estrogen and the uterine lining continues to thicken. Days 17-27 are termed safe intercourse days because ovulation has already occurred. The progesterone produced by the corpus luteum makes the mucus of the cervix unfavorable for the transport of sperm. Therefore, pregnancy should not occur but contraception is still recommended. If the egg is not fertilized, the corpus luteum degenerates, the hormone levels decrease and the endometrial lining is sloughed off and expelled through the vagina. This marks the beginning of a new follicular phase and a new cycle. On the other hand, if the egg is fertilized, the corpus luteum continues to secrete estrogen and progesterone and the endometrial lining of the uterus is not sloughed off. The lining becomes a site of implantation for the fertilized egg. The female is pregnant and embryo development begins.
APPENDIX C
MENSTRUAL CYCLE KNOWLEDGE SURVEY
©2007 fm²w
Please use the Scantron© provided to mark your answers.

1. Gender- Female (A) or Male (B)

2. Age
   a. 17-21
   b. 22-26
   c. 27-30
   d. Over 30

3. Do you live in an Urban (A) or Rural (B) Community?
   (Rural community population is less than 2500. Urban community population is more than 2500.)

4. Do you have any biological children?   A. Yes       B. NO

Have you participated in any of the following:

5. School Sex Education Program   A. Yes       B. NO

6. Couple to Couple League   A. Yes       B. NO

Where were you taught about sex education or given information about sex topics?

7. Upper Elementary School   A. Yes       B. NO

8. Middle School   A. Yes       B. NO

9. High School   A. Yes       B. NO

10. From your Friends or Relatives   A. Yes       B. NO

11. From your Parents   A. Yes       B. NO

12. Private Organization or Agency   A. Yes       B. NO

13. Public Organization   A. Yes       B. NO
14. Church of Other Religious Organization  
   A. Yes  
   B. NO

15-17. Have you seen any of the following diagrams before?

   A. Yes-exactly  
   B. Modification  
   C. Not at all

15. ![Diagrams](image1)

16. ![Diagrams](image2)

17. ![Diagrams](image3)
For the statements below, use A for True, B for False and C for Don’t Know

18. The menstrual cycle occurs every 28 days in all women.

19. The menstrual cycle is something that only females should understand.

20. Understanding the menstrual cycle will help you to prevent pregnancy.

21. Menses/Menstruation may last for three to five days.

22. Menses/Menstruation is when the endometrial lining of the uterus is shed and marks the first day of the menstrual cycle.

23. In the female, ovaries start producing mature eggs at the time of puberty.

24. Ovulation is likely to occur 14 days after the first day of menses/menstruation in a 28 day cycle.

25. Ovulation is the release of the egg from the ovary.

26. After the egg is released, it may stay viable for 48 hours.

27. The fertile period is the best time for a female to get pregnant.

28. Contraception must be used at all times to prevent pregnancy.

29. Condoms prevent sexually transmitted diseases.

30. A female may become pregnant the first time she has intercourse.

31. A female is unlikely to get pregnant during normal menses.

32. In the male, sperm production begins at birth and continues until age 65.

33. Fertilization occurs when several sperm and egg combine.

34. The failure of the egg to be fertilized results in menses/menstruation.

35. Menopause is when a female stops producing eggs.

36. The control of the menstrual cycle is due to hormones being released from the brain.
37. Pregnancy can occur if a woman has not begun menstruation.

38. Fertilization normally occurs inside the woman’s uterus.

39. Most females are able to predict accurately when they will ovulate.

40. Males should not understand the physiology of the menstrual cycle.

41. The life of a sperm inside the female reproductive tract is 24 hours.
APPENDIX D

MENSTRUAL DIAGRAM FIGURES

Figure 1- http://ahbs.suny dutchess.edu/Scala/Bio102/PDF/Menstrual.jpg

Figure 2- http://dept.kent.edu/biology/courses/60495/menstrualcycle.jpg
Figure 3- http://www.wisc.edu/ansci_repro/lec/lec_11/parts_menstrual.jpg

Figure 4- http://www.ovulation-calculator.com/cycle.gif
Figure 5- http://www.tiscali.co.uk/reference/encyclopaedia/hutchinson/m0006832.html

Figure 7- http://scc.uchicago.edu/menstruationcycle2.jpg

Figure 8- http://www.fhi.org/pic/mencycle.gif
Figure 9 [http://www.nfpsoftware.com/diagram.gif]

Figure 10- [http://www.leeds.ac.uk/lsmp/healthadvice/reproduction/Cycle.JPG]
Figure 11- http://users.kua.net/rstone/28day_cycle.jpg

Figure 12- http://www.epigee.org/guide/graphics/wheel.gif
Figure 13-Modern Biology 2002 by Holt, Rinehart and Winston

Figure 14-Health and Wellness
## APPENDIX E

### MENSTRUAL CYCLE DIAGRAM CLASSIFICATION

#### Menstrual Cycle Diagram Classification

<table>
<thead>
<tr>
<th>Linear Diagrams</th>
<th>Figure No.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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</thead>
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<tr>
<td>No of panels</td>
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<td>6</td>
<td>4</td>
<td>0</td>
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<td>0</td>
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<tr>
<td>Total no of colors used</td>
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<td>14</td>
<td>9</td>
<td>8</td>
<td>5</td>
<td>4</td>
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#### Hormone Colors

<table>
<thead>
<tr>
<th>Hormone</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estrogen</td>
<td>turquoise</td>
<td>pink</td>
<td>red</td>
<td>yellow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Progesterone</td>
<td>royal blue</td>
<td>dotted black</td>
<td>violet</td>
<td>turquoise</td>
<td></td>
<td></td>
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<tr>
<td>FSH</td>
<td>pink</td>
<td>turquoise</td>
<td>black</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LH</td>
<td>purple</td>
<td>pink</td>
<td>blue</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GnRH</td>
<td>turquoise</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inhibin</td>
<td>turquoise</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Anatomy

<table>
<thead>
<tr>
<th>Ovarian Development, color of structures</th>
<th>yes, pink/yellow</th>
<th>yes, purple, yellow</th>
<th>yes, green, yellow</th>
<th>yes, all pink</th>
<th>yes, pink/blue, yellow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uterine Lining</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>no, entire tract</td>
<td>yes</td>
</tr>
<tr>
<td>Positive features of the graph</td>
<td>callout of ovary and uterine lining, hypothalamus</td>
<td>each panel is labeled; uterus described; basal body temp; hormone levels</td>
<td>panels labeled, days of cycle labeled within not at the bottom</td>
<td>retrieved file at one time and when went back for clarification no site!</td>
<td>Entire tract with a description; fertilization possibility</td>
</tr>
<tr>
<td>Negative features of the graph</td>
<td>labeling of follicular/luteal phase at the bottom of entire graph, confusing b/c this applies to ovary not uterus; growth mentioned not regression</td>
<td></td>
<td>Phases are labeled on top of graph (possibly because from a course and the instructor added these labels)</td>
<td></td>
<td>repro tract a little crowded as well as follicle with too many labels and descriptions</td>
</tr>
<tr>
<td>Misconceptions</td>
<td>callout of ovary-all follicles grow at once</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Figure No.</td>
<td>7</td>
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<tr>
<td>hormone colors</td>
<td>10</td>
<td>9</td>
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</tr>
<tr>
<td>Estrogen</td>
<td>blue</td>
<td>red</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Progesterone</td>
<td>purple</td>
<td>green</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FSH</td>
<td>purple</td>
<td>blue</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LH</td>
<td>turquoise</td>
<td>orange</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GnRH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inhibin</td>
<td></td>
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<td></td>
<td></td>
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</tbody>
</table>

**Anatomy**

<table>
<thead>
<tr>
<th></th>
<th>Ovarian Development, color of structures</th>
<th>yes, green, blue</th>
<th>yes, pink/blue, yellow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uterine Lining</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

**Positive features of the graph**

<table>
<thead>
<tr>
<th></th>
<th>all text but provides good description of days and events; safe and unsafe days</th>
<th>legend, not too many labels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>best colors of ovaoran structures; separates ovarian events from endometrial events; good labels</td>
<td></td>
</tr>
</tbody>
</table>

**Negative features of the graph**

<table>
<thead>
<tr>
<th></th>
<th>difficult to distinguish hormones because layered on top of each other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no hormones or structures</td>
</tr>
</tbody>
</table>

**Misconceptions**
### Menstrual Cycle Diagram Classification

#### Circular Diagrams

<table>
<thead>
<tr>
<th>Figure No.</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
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</thead>
<tbody>
<tr>
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<td>2</td>
<td>28</td>
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<td>3</td>
<td>3</td>
<td>3</td>
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</table>

#### Hormone Colors

<table>
<thead>
<tr>
<th>Hormone</th>
<th>Estrogen</th>
<th>Progesterone</th>
<th>FSH</th>
<th>LH</th>
<th>GnRH</th>
<th>Inhibin</th>
</tr>
</thead>
</table>

#### Anatomy

- **Ovarian Development, color of structures**
- **Uterine Lining**

#### Positive Features of the Graph

- Fertile time
- Phases of fertility
- Menstruation period, pre & post ovulation and day labels
- Looks like a birth control pill package, menstruation, fertile period

#### Negative Features of the Graph

- Menstruation instead of "bleeding" begins
- Menstruation, fertile period

#### Misconceptions

125
APPENDIX F

IRB FORMS
Part A: DETERMINATION OF "RESEARCH" and POTENTIAL FOR RISK

This section determines whether the project meets the Department of Health and Human Services (HSS) definition of research involving human subjects, and if not, whether it nevertheless presents more than "minimal risk" to human subjects that makes IRB review prudent and necessary.

1. Is the project involving human subjects a systematic investigation, including research, development, testing, or evaluation, designed to develop or contribute to generalizable knowledge?

(No instructional development and service programs will include a "research" component that may fall within HSS' definition of human subject research).

☐ YES
☐ NO

2. Does the project present physical, psychological, social or legal risks to the participants reasonably expected to exceed those risks normally experienced in daily life or in routine diagnostic physical or psychological examination or testing? You must consider the consequences if individual data inadvertently become public.

☐ YES  Stop. This research cannot be exempted—submit application for IRB review.
☐ NO  Continue to see if research can be exempted from IRB oversight

3. Are any of your participants incarcerated?

☐ YES  Stop. This research cannot be exempted—submit application for IRB review.
☐ NO  Continue to see if research can be exempted from IRB oversight.

4. Are you obtaining any health information from a health care provider that contains any of the identifiers listed below?
   A. Names
   B. Address: street address, city, county, precinct, ZIP code, and their equivalent geocodes. Exception for ZIP codes: The initial three digits of the ZIP Code may be used, if according to current publicly available data from the Bureau of the Census: (1) The geographic unit formed by combining all ZIP codes with the same three initial digits contains more than 20,000 people; and (2) the initial three digits of a ZIP code for all such geographic units containing 20,000 or fewer people is changed to ‘000’. (Note: The 17 currently restricted 3-digit ZIP codes to be replaced with ‘000’ include: 036, 059, 063, 102, 203, 556, 692, 790, 821, 823, 830, 831, 878, 879, 884, 890, and 893.)
   C. Dates related to individuals
       i. Birth date
       ii. Admission date
       iii. Discharge date
       iv. Date of death
       v. And all ages over 89 and all elements of dates (including year) indicative of such age. Such ages and elements may be aggregated into a single category of age 90 or older.
D. Telephone numbers;
E. Fax numbers;
F. Electronic mail addresses;
G. Social security numbers;
H. Medical record numbers; (including prescription numbers and clinical trial numbers)
I. Health plan beneficiary numbers;
J. Account numbers;
K. Certificate/license numbers;
L. Vehicle identifiers and serial numbers including license plate numbers;
M. Device identifiers and serial numbers;
N. Web Universal Resource Locators (URLs);
O. Internet Protocol (IP) address numbers;
P. Biometric identifiers, including finger and voice prints;
Q. Full face photographic images and any comparable images; and
R. Any other unique identifying number, characteristic, or code; except a code used for re-identification purposes; and
S. The facility does not have actual knowledge that the information could be used alone or in combination with other information to identify an individual who is the subject of the information.

☐ YES Stop. This research cannot be exempted—submit application for IRB review.

☑ NO Continue to see if research can be exempted from IRB oversight.

Part B: EXEMPTION CRITERIA FOR RESEARCH PROJECTS

Research is exemptable when all research methods are one or more of the following five categories. Check statements that apply to your study:

☐ 1. In education setting, research to evaluate normal educational practices.

☐ 2. For research not involving vulnerable people [prisoner, fetus, pregnancy, children, or mentally impaired]: observe public behavior (including participatory observation), or do interviews or surveys or educational tests:

The research must also comply with one of the following:

Either that
☑ a) the participants cannot be identified, directly or statistically;

Or that
☑ b) the responses/observations could not harm participants if made public;
or that

  c) federal statute(s) completely protect all participants' confidentiality.

or that

3. For research not involving vulnerable people [prisoner, fetus, pregnancy, children, or mentally impaired]; observe public behavior (including participatory observation), or do interviews or surveys or educational tests:
   • all respondents are elected, appointed, or candidates for public officials.

4. Uses only existing data, documents, records, or specimens properly obtained.

The research must also comply with one of the following:

either that:

  a) subjects cannot be identified in the research data
directly or statistically, and no-one can trace back from research data to identify a participant;

or that

  b) the sources are publicly available

5. Research or demonstration service/care programs, e.g. health care delivery.

   The research must also comply with all of the following:

   a) it is directly conducted or approved by the head of a US Govt. department or agency.

   and that

   b) it concerns only issues under usual administrative control (46 Fed Reg 9246-8), e.g., regulations, eligibility, services, or delivery systems;

   and that

   c) its research/evaluation methods are also exempt from IRB review.

6. For research not involving vulnerable volunteers [see "2 & 3" above], do food research to evaluate quality, taste, or consumer acceptance.

   The research must also comply with one of the following:

either that

  a) the food has no additives;

or that

  b) the food is certified safe by the USDA, FDA, or EPA.

------------------------------------------------------------------------------------------------------------------------------------

NOTE: Copies of your IRB stamped consent form must be used in obtaining consent. Even when exempted, the researcher is required to exercise prudence in protecting the interests of research subjects, obtain informed consent if appropriate, and must conform to the Ethical Principles and Guidelines for the Protection of Human Subjects (Belmont Report), 45 CFR 46, and LSU Guide to
Informed Consent: (Available from OSP or http://www.lsu.edu/irb)

HUMAN SUBJECTS SCREENING COMMITTEE MEMBERS can assist & review:

COLLEGE OF ARTS AND SCIENCES: MASS COMMUN/SOC W/AG:
Dr. Noell * (Psych) 578-4119 Dr. Nelson (Mass C) 578-6686
Dr. Geiselman * (Psych) 763-2695 Dr. Keenan* (Hum Ecol) 578-1708
Dr. Beggs (Soclo) 578-1119 Dr. Belleau (Hum Ecol) 578-1535
Dr. Honeycutt (Comm. Stu.) 578-8676 Dr. Osborne (Mass C) 578-9296
Dr. Dibo (Comm Sc/Dis) 578-3938 Dr. Timothy F. Page (Soc Wk) 578-1358
Dr. Copeland* (Psych) 578-4117

ED/LIBRARIES/INFO SCI BUSINESS
Ms. Phillips (LSU Libraries) 578-6552 Dr. McKee (Marketing) 578-8788
Dr. Landin* (Kinesiol) 578-2916
Dr. MacGregor (ELRC) 578-2150
Dr. Gansle (Curric & I) 578-7213
Dr. Ann Trousdale* (Curric & I) 578-2330

(* = IRB member)
APPENDIX G

CONSENT FORM

Louisiana State University- Baton Rouge
Institutional Review Board for Human Research

CONSENT FORM

1. Study Title: Visualizing the Menstrual Cycle: Effects of a Redesigned Diagram on Community College Biology Students’ Learning

2. Performance Site: LA Community Colleges

3. Investigators: The following investigators are available for questions about this study, Student Investigator: Mrs. Francesca M. Mellieon-Williams, (225) 205-2154 or fmelli1@lsu.edu My Advisor: Dr. James Wandersee can be reached at LSU at (225)578-2348 or jwander@lsu.edu.

4. Purpose of the Study: The purpose of this research project is to determine what effect a redesign of the menstrual cycle diagram has on student learning.

5. Subject Inclusion: Individuals between the ages of 18 and 65 who are registered in introductory biology courses.

6. Number of subjects: 100

7. Study Procedures: The study will be conducted in two class meetings. In the first meeting, subjects will spend approximately 5 minutes completing a pre-test about menstrual cycle knowledge. The students will then be presented with the new menstrual cycle diagram or the layered menstrual diagram for approximately 10 minutes. In the second meeting, subjects will spend approximately 5 completing a post-test about menstrual cycle knowledge. Six students from each course will be randomly selected for interviews.

8. Benefits: As a result of this study, students will have a better understanding of the concepts of the menstrual cycle.

9. Risks: There are no medical, personal, social or academic risks
anticipated in this study. Your grade in this course or any other will not be adversely affected by participation in this project.

10. Right to Refuse: Subjects may choose not to participate or to withdraw from the study at any time without penalty or loss of any benefit to which they might otherwise be entitled.

11. Privacy: Results of the study may be published, but no names or identifying information will be included in the publication. Subject identity will remain confidential unless disclosure is required by law.

12. Signatures:

The study has been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to the investigators. If I have questions about subjects’ rights or other concerns, I can contact Robert C. Mathews, Institutional Review Board, and (225) 578-8692. I agree to participate in the study described above and acknowledge the investigator's obligation to provide me with a signed copy of this consent form.

________________________________     _____________________________
Signature of Subject     Printed Name

____________________________________
Date
APPENDIX H

INTERVIEW PROTOCOL

Thank student for participating in interviews. Let them know that session will be recorded but their name used.

1. Please state your sex and age.

2. Have you had any type of sex education before this presentation?

3. Which diagram was your course presented?

4. Present Student with a copy of the diagram.
   a. Please label on this diagram when pregnancy is most likely to occur.
   b. Please label on this diagram when pregnancy should not occur.

5. Why did you select these days?

6. What do you think was the most valuable concept that you learned from this diagram and presentation?

7. Let’s look at the menstrual cycle diagram again but in a different format.
   a. What is the first difference that you notice about this diagram? Do you think it is good or bad?
   b. Let’s go through this diagram.
   c. Do you think this diagram is easier than the diagram that was presented in your class? Why or Why not?

8. After this presentation/interaction, how will this affect your future reproductive health decisions? Will you share this information with any of your peers? Why or Why not?
Thank student again for participating and present them with incentive for participating in interview (gift card to local restaurant).
Chancellor,
______________ Community College

Dear Dr__________,

Drawing on four years of professional experience in the field of education, I am preparing to complete my doctoral degree in the Department of Educational Theory, Policy and Practice at Louisiana State University. One of the final components of the doctoral program is the completion of a research project. The Institutional Review Board for Human Research Subject Protection at LSU has approved my request to conduct my research here at ____________ Community College.

As an adjunct instructor, I have been in contact with __________________, and __________________, about the necessary procedures for research here at the college. With your approval, I would like to begin my research. Thank you for your cooperation in this matter and for assisting me in completing my degree requirements.

Sincerely,

Francesca M. Mellieon-Williams, M.S.
Attachment
Cc: ____________________
APPENDIX J

INTERVIEW TRANSCRIPTIONS

STUDENT 1

RESEARCHER: First just state your sex male or female

Student 1: MALE

RESEARCHER: Age

Student 1: 18

RESEARCHER: Have you had any type of sex education before this instruction?

Student 1: High school

RESEARCHER: Which diagram did your class see first?

Student 1: This one-linear (points to linear diagram)

RESEARCHER: And from using this diagram what do you remember from class where pregnancy is most likely to occur on this diagram?

Student 1: Ummm, right here (points to ovulation), ovulation

RESEARCHER: And when should pregnancy not occur, using this diagram?

Student 1: Ummm, I think it was like 14 days or something after

RESEARCHER: What do you think was most valuable thing you learned from this diagram and from class presentation, that you can transfer to others?

Student 1: About the times where you have Free time or fun time or whatever

RESEARCHER: Now this diagram was presented after the first, now, which one do you think is better for your reproductive lifestyle?
Student 1: CALENDAR (SMILES EXCESSIVELY WHEN SAYING HIS CHOICE)

RESEARCHER: And why?

Student 1: EASY TO READ

RESEARCHER: After you have seen the calendar and received a copy, how will this help your future reproductive health decisions?

Student 1: Ummm, ummmm me personally I always strap up so I understand it more as far as some girls play with you about this and I will be more comfortable with situation

RESEARCHER: Do think will share with friends

Student 1: YEAH, YEA, YEAH... (LAUGHS)

RESEARCHER: Anything you want too add about the diagram or the presentation?

Student 1: Ummm, everyone should use calendar.....laughs

RESEARCHER: Thank you very much
RESEARCHER: First just state your sex male or female

Student2: FEMALE

RESEARCHER: Age

Student2: 19

RESEARCHER: Have you had any type of sex education before this instruction?

Student2: No

RESEARCHER: Which diagram did your class see first? (Shows both)

Student2: Ummm. I think it was theses-linear (points to linear diagram)

RESEARCHER: AND FROM USING THIS DIAGRAM, WHAT YOU REMEMBER FROM CLASS can you point out to me WHERE/when PREGNANCY is MOST LIKELY TO OCCUR on this diagram?

Student2: Ummm, right here (days 15-17)

RESEARCHER: And when should pregnancy not occur, using this diagram?

Student2: Right here and right here (menses pointed out)

RESEARCHER: Why these days

Student2: ’Cause it’s when you have your period

RESEARCHER: What do you think was most valuable concept you learned from this diagram and from class presentation?

Student2: Ummm, it helps like people know when you can get pregnant and when you can’t …. so people be smarter about it
RESEARCHER: Now after the posttest, this diagram (calendar) was presented, which of the two diagrams do you think is the better diagram?

Student2: This one-CALENDAR

RESEARCHER: And why do you think that?

Student2: ‘Cause it has like little symbols and lets you know like when you are on your period and when you can have fun and then when you are fertile (answers very confident by using fingers to point out days)

RESEARCHER: So which of these diagrams if you had to present it to someone to explain to them the things you just said, which one would you choose?

Student2: Ummm, this one (points to calendar)

RESEARCHER: After the presentation of both diagrams and the things we talked about in class, how do you think this affect your future reproductive health decisions?

Student2: Ummm, It’ll like give me more knowledge like when I can conceive and stuff …. when I am ready to have a baby

RESEARCHER: And do you think you will pass this information on to you friends?

Student2: Sure (with smiles!)

RESEARCHER: Why do you think so?

Student2: So they don’t get pregnant when they do not want to… (laughs)

RESEARCHER: Now from this survey that you took, were there any of the questions that you felt were difficult, you didn’t understand the way the question was worded?

Student2: No
RESEARCHER: Is there anything you would like to add about either diagrams, comments about either one, suggestions?

Student2:: Nope

RESEARCHER: Thank you very much, appreciate your time.
STUDENT 3

RESEARCHER: First just state your sex

Student 3: FEMALE

RESEARCHER: Age

Student 3: 19

RESEARCHER: Which diagram did your class see first? (Shows both)

Student 3: Did I see first?

RESEARCHER: Yeah, which was presented to you first? When you took the pretest?

Student 3: Like….

Student 3: Ummm. I think it was this one (points to linear diagram)

RESEARCHER: AND FROM USING THIS DIAGRAM, can you point out to /when PREGNANCY is MOST LIKELY TO OCCUR on this diagram?

Student 3: Right here? (pointed to ovulation not too sure)

RESEARCHER: And when should pregnancy not occur?

Student 3: I don’t know (in a whisper and with smiles)

RESEARCHER: From the presentation and from the diagram do you remember anything specific about the diagram that you take from this or anything from the presentation about the menstrual cycle?

Student 3: Ummm, I understood the other one better, I didn’t really get this one.

RESEARCHER: Ok

Student 3: Do you want me to tell you what I understand from this one?
RESEARCHER: Yes why do you think you understand this one better?

Student 3: ‘cause like this shows like when you are on your cycle and that shows like the most hazardous days and the most happy days… I don’t know I understand that one better because of the symbols that are used.

RESEARCHER: So you think it is because the symbols are easily identified?

Student 3: This one (linear) looks like a lot of stuff at one time and I don’t really understand that one

RESEARCHER: So you think that the calendar format is better?

Student 3: Yes ma’m

RESEARCHER: And from both presentations, how will this affect your future reproductive health decisions? Like in the future how will this affect you because you will have your personal copy of this calendar?

Student 3: See I didn’t know that there were certain days that you could get pregnant, I know that there was a chance all the time but it’ll help me plan like when I do plan to have children, I know which days are best to try and conceive

RESEARCHER: Will you share any of this information with your peers other than your friends in the class?

Student 3: Yea (laughs)

Student 3: My boyfriend (laughs)

RESEARCHER: Why with him?

Student 3: Well, we always use protection and I just thought it was neat because I
really didn’t know that there were certain days that you could really get pregnant like right after your period. I didn’t know that… Actually, I did share it with somebody. (laughs)

**RESEARCHER:** Who did you share it with?

**Student 3:** One of my friends.

**RESEARCHER:** Now from the survey were there any questions that gave you problems, you didn’t understand the way it was worded?

**Student 3:** No I think it was pretty self explanatory

**RESEARCHER:** Did you have any type of sex education instruction before?

**Student 3:** High school, ninth grade

**RESEARCHER:** And when you had this was it separated or boys and girls together?

**Student 3:** Boys and girls together

**RESEARCHER:** Any other questions? Anything you want to add about the diagram or the presentation?

**Student 3:** No (laughs)

**RESEARCHER:** Thank you.

**Student 3:** Thank you.
RESEARCHER: First just state your sex

Student 4: Male

RESEARCHER: Age

Student 4: 18

RESEARCHER: Have you had any type of sex education before this instruction?

Student 4: Yes, of course, Catholic High School (all boys school), Jr. High Catholic, Public Middle School (males and females separate)

RESEARCHER: Which diagram did your class see first? (Shows both)

Student 4: None, tell you the truth, I didn’t recognize any of these until you showed us

RESEARCHER: Ok, so you have never seen anything like this before this class?

Student 4: Yeah

RESEARCHER: And in your class, which one of these did I show you first?

Student 4: I guess this one but I wasn’t really paying attention… Ok, this one

RESEARCHER: That is the linear diagram, AND FROM USING THIS DIAGRAM can you point out to me WHERE/when PREGNANCY is MOST LIKELY TO OCCUR on this diagram?

Student 4: Ummm, when the estrogen levels are the highest?... I’m right because I do not want to make you feel like a bad teacher.

RESEARCHER: No that has nothing to do with it, that is why I need to know.

RESEARCHER: And when should pregnancy not occur,
using this diagram?

Student 4:: Not?

RESEARCHER: Yes, not.

Student 4:: Ummm… at the lowest before…after…ummm, I don’t remember

RESEARCHER: Ok, that’s fine

Student 4:: She’s (meaning researcher) is going to kill me

RESEARCHER: No, I am not, it is very objective

RESEARCHER: Now is there anything from this diagram is there anything that you would be able to explain to someone else…?

Student 4:: No!!!! except for the estrogen level because I hear that word all the time…

RESEARCHER: And why is that?

Student 4:: Ummm… I don’t know….

RESEARCHER: Why do hear that word all the time?

Student 4:: Rap songs, because I like music.

RESEARCHER: The first diagram that you were presented was a linear diagram, the second diagram after the posttest I showed you was this calendar,….

Student 4:: Correct…

RESEARCHER: First to compare the calendar to the linear diagram, which one do you feel is better for your lifestyle?

Student 4:: This one…it looks simpler

RESEARCHER: What about it looks simpler

Student 4: Ummm, the way it is presented it has all the faces, it has the little.. I
forgot what this is called…?

RESEARCHER: The legend…

Student 4: Yeah, the legend

Student 4: You can make it more flashier, though...

RESEARCHER: How?

Student 4: It seems simple…looking at it just seems simple like anybody can get it...

RESEARCHER: Don’t you think anybody should be able to get it, though?

Student 4: Yeah but I mean, it’s just not flashy, it just has lines in it..

RESEARCHER: What would you suggest that I do to it?

Student 4: I don’t know just make it more flashy…

RESEARCHER: In what way?

Student 4: I don’t know cause you are a scientist… and scientist is dull sorry to say

RESEARCHER: No we are not

Student 4: Ya’ll are…

Student 4: My people are like artist and stuff so…

RESEARCHER: So you say your people, what do you mean?

Student 4: My dad is a contractor so he can draw, my uncle does ummm, animations and stuff and his son is an artist so he can draw

RESEARCHER: So you think I need to add more artistic….

Student 4: Yeah…make it flashy..

RESEARCHER: ohhh….Thanks for the suggestion, if I make it more flashy, do you think it will be more appealing to people your age or?
Student 4: I don’t know, I seem childish right now because I am 18 and I’m saying should be more flashy…

RESEARCHER: But I am trying to target people like you, because you are the people that need to know and I need to know what you think because that is your opinion and that is why I am asking you to know….. So you think this one is easier?

Student 4: Yeah, it’s easier but needs more…

RESEARCHER: … So from either diagram and from the presentation how do you think this is going to affect your future reproductive health decisions?

Student 4: Well, I’m a guy so I really doubt this is gonna make a difference…

RESEARCHER: You don’t think it will..

Student 4: I’m still just you know … a guy

RESEARCHER: Do you think you will share this information, not just the calendar itself but like anything we talked about when we talked about the menstrual cycle?

Student 4: No because I don’t ever think that I’m a be sexually active with a girl who I don’t know, who’s not my wife without a condom…

RESEARCHER: That’s awesome

Student 4: It’s still good to know but I just don’t think I am going to…

RESEARCHER: … that is good and just you as a person…You think it’s good information…

Student 4: Yeah…. It’s good information…

RESEARCHER: So you think it’s good information and if you choose to and if you
don’t choose to you have the right to decide

Student 4: Yeah….

RESEARCHER: is there anything else you would like to add about the linear
diagram or presentation itself?

Student 4: Shakes head no….

RESEARCHER: Ok, now from the survey was there any question that you didn’t understand…

Student 4: Yes…

RESEARCHER: … that caused you, which one was it can you point it out for me?

Student 4: (looks through questions)….ummm… I only put three of them that I did not know.. ummm. Oh number 22 says menstruation is when the endometrial (has trouble pronouncing word) lining of the uterus is shed and marks the beginning of the menstrual cycle

RESEARCHER: What about that caused problems for you?

Student 4: I don’t understand it…. 

RESEARCHER: You don’t understand what is says, Ok…

Student 4: Ummm…contraception must be used at all times to prevent pregnancy…ummm…like is that another word for condom?

RESEARCHER: Yes..

Student 4: Oh that is…. 

RESEARCHER: Yes…

Student 4: Oh alright, I feel stupid….and Ummm pregnancy can occur if a woman has not begun menstruation…. That’s true?... I don’t know …
RESEARCHER: What do you think?

Student 4: I don’t know

RESEARCHER: Technically, no..unless she is here (first ovulation) and has not menstruated, if something unforsaken happens and she may be molested or something and she has not show signs of having a period; it is possible for her to get pregnant…. Any other questions?

Student 4: Nope…

RESEARCHER: Ok, thank you very much for your time

Student 4: Alright
STUDENT 5

RESEARCHER: State your sex and age

Student 5: Female, 31

RESEARCHER: Have you had any type of sex education, natural family planning, or any type of instruction?

Student 5: Yeah, sex education

RESEARCHER: When?

Student 5: Pretty much all through school

RESEARCHER: Where you in a public school or private school?

Student 5: Public…. Texas

RESEARCHER: Of course, more advanced when it comes to sex education in school… In your classes was it segregated?

Student 5: Segregated to high school then in high school together

RESEARCHER: Had you in your sex education programs seen any of these diagrams before?

Student 5: Yeah I had seen forms of these (points to linear) all three of those ( has \ panels with different areas covered in each)

RESEARCHER: From your class which of the diagrams did you see first? When I gave the presentation in class, which was presented to you first?

Student 5: This one, I think (linear pointed out)

RESEARCHER: Ok, now just using this diagram here (referring to linear only), when is pregnancy most likely to occur?

Student 5: …. (hesitating) Right through here, 13-21, I guess? (not sure of choice)
RESEARCHER: And when would pregnancy most likely to not occur?

Student 5: 22-27? I think…

RESEARCHER: Why did you pick these days for each?

Student 5: Because that was when everything was the lowest, I was going by that (hormone levels)… ummm.. I can’t read this chart well

RESEARCHER: That’s ok, total honesty is what I am looking for…From this diagram and from the presentation, what is the one thing or concept that stuck out to you? Is there anything that you will remember from this picture

Student 5: From this picture, umm no (shaking head no)

RESEARCHER: Now after you took the posttest, I presented you with this calendar, which do you think is a better diagram for your reproductive lifestyle?

Student 5: The calendar

RESEARCHER: And why do feel that way?

Student 5: Because it is easier to read, it makes sense

RESEARCHER: What about it makes it easy to read?

Student 5: The symbols, the fact that you can start with day one and the little smiley faces (laughs)

RESEARCHER: After this presentation or interaction with both diagrams, how do you think this will affect your future reproductive health decisions? Do you think it will affect it at all, won’t affect it?

Student 5: Well if I ever decide to have kids, then I know… I know how to use the chart and determine when I can and cannot get pregnant.
RESEARCHER: Do you think you should have your own personal copy of this?

Student 5: Yeah!

RESEARCHER: Will you share any of this information with any of your peers, family members?

Student 5: Oh Yeah! (shakes head yes)

RESEARCHER: And why is that?

Student 5: Because I work with all girls

RESEARCHER: Oh really!

Student 5: Yeah.

RESEARCHER: What type of work do you do?

Student 5: I am a bartender at local bar.

RESEARCHER: Looking at the survey, was there anything on the survey that caused you problems, the question was not worded well, you thought it could be explained better?

Student 5: No!

RESEARCHER: Is there anything that you would like to suggest as far as how the diagram should be presented, which one should be used more? Anything like that?

Student 5: I just think that this one (points to calendar with confidence) is better, it is easier to understand.

RESEARCHER: Thank you very much for your time, I appreciate you.

Student 5: Anytime.
STUDENT 6

RESEARCHER: State your sex and age

Student 6: Male, 20

RESEARCHER: Before this presentation in class, have you had type of sex education? Like in high school, middle school?

Student 6: No

RESEARCHER: Did you attend public or private/where?

Student 6: Public, Louisiana

RESEARCHER: In your class, which of these diagrams was shown to you first?

Student 6: It was the bottom one (points to the linear diagram)

RESEARCHER: And from this diagram can you point out to me when pregnancy is most likely to occur?

Student 6: I say…this time? (not sure, points to luteal phase)

RESEARCHER: Is there any reason you picked that time?

Student 6: … That was a guess (honestly stating)

RESEARCHER: So when do you think it should not happen?

Student 6: Not sure

RESEARCHER: Ok… now after you took the posttest in class, I presented you with this one, this calendar? And looking at the two pictures, which do you think is best for your lifestyle?

Student 6: This one (points to calendar).
RESEARCHER: What about the calendar makes it best for you?

Student 6: With this one, you can know when a girl’s period is going you know when she releases her eggs and when it’s time to have sex without worried about getting her pregnant.

RESEARCHER: In addition to knowing that, what about the calendar makes it easier for you?

Student 6: I guess the pictures that it shows.

RESEARCHER: So from this presentation in class and interaction with this new knowledge since you had no previous instruction, how do you think this will affect your future reproductive health decisions?

Student 6: … It will help me out a lot (sha).

RESEARCHER: Why do you say that?

Student 6: ‘Cause now that I know more and I took biology and learned about this, it’ll give me a heads up about things in life

RESEARCHER: Do you think you will share this information because you will receive a copy of the calendar?

Student 6: Yes..

RESEARCHER: And why is that?

Student 6: Because my friends need to know this!

RESEARCHER: Why do you think they need to know?

Student 6: I have a friend who is a sex addict, I got another friend who is a male whore

RESEARCHER: And you think they need to be aware of what is going on?
Student 6: …Yeah!

RESEARCHER: The last thing that I want to ask, is from the survey that we took in class, are there any questions that you had problems with, that should have been worded better?

Student 6: (Looks through survey and shakes, No!)

RESEARCHER: Is there anything you want to add about the presentation that was given something to make it better, it needs more, something should be taken out? Anything about the diagram that would make the diagram better?

Student 6: Well, I noticed that we did not see this diagram right here (points to circular diagram)… I guess we should have this one also, so people can know about this one too, rather than just two because this may be easier for someone else

RESEARCHER: This diagram, the one that you pointed out is typically used for natural family planning, when people are trying to conceive. … Anything else…

Student 6: No

RESEARCHER: Thank you very much…

Student 6: Ummm when do we get our gift cards?

RESEARCHER: I will bring them to class next week.
STUDENT 7 AND STUDENT 8

RESEARCHER: First I need you to state your sex and age

Student 7: Female 22 – note she is expecting a child

Student 8: Female 30

RESEARCHER: Of these two diagrams which was presented to you in your class?

Student 7: Pointed to calendar

Student 8: Pointed to calendar

RESEARCHER: From this diagram can you tell me when pregnancy is most likely to occur?

Student 8: Um, where the triangles are at..

Student 7: Um, 11-15

RESEARCHER: Why did you pick triangles (student 8)?

Student 8: Because to me it’s kinda like a caution

RESEARCHER: And what about Why did you pick these days (student 8)?

Student 7: Because like at the 12th -15th day after your period is when you ovulate to get pregnant

RESEARCHER: What do you think was the most valuable concept you got from this diagram and presentation?

Student 8: I think it was valuable because it can help you so can prevent pregnancy or so you can get pregnant, in case you can’t take birth control or some religions don’t allow it

Student 7: (Laughs)… to know when you can get pregnant so you know when you
ovulate to have sex to get a baby

**RESEARCHER:** Is there something that sticks out that makes this diagram easy for you?

**Student 8:** The smiley faces because tells you when you can (laughs)... the

**RESEARCHER:** So the symbols is what you like?

**Student 8:** Yeah the symbols

**RESEARCHER:** And what about you for people that you know that are in your situation because I know that you had mentioned that you had gone to couple to couple league

**Student 7:** Yeah, ‘cause ours is kinda like this and you can tell your husband that on this day you have to be ready, so you can’t do anything for these days and that’s how we did it and ours was kinda like that

**RESEARCHER:** Now looking at this one, this is another diagram that is more traditional that you see in text books....

**Student 7:** And uhh, I do not know how to read that

**Student 8:** Yeah, that wouldn’t make any sense to me

**RESEARCHER:** Would you share this information with anyone?

**Student 8:** I would probably share this with my teenage daughter whenever they come to me and say they are ready to do this, and I would sit down with them and convince them to not to do, but if they want to do it to use protection or use the diagram that as a precaution too.

**Student 7:** I told my best friend who is getting married and uh they never had sex so
she is trying to see what kind of birth control to use and I have recommended the chart to her and stated, that you should do this, you should do this, like and if you choose not that is fine and I got pregnant with my first daughter on birth control.…

**Student 8:** I got pregnant with my daughter on birth control too

**Student 7:** so yeah that made the choice for me and my husband that we were doing something different and it took us a few months until we got used to it but it and we wanted to get pregnant this time and when I didn’t want to get pregnant I didn’t, I just like this because it is just so accurate

**RESEARCHER:** Is there anything you would recommend changing about this diagram or adding to it or taking away?

**Student 8:** Um, do they have on here that this may not be 100% correct because I know like for awhile I had a messed up cycle, so do they have that on here?

**RESEARCHER:** No I don’t have it on here but

**Student 8:** Somewhere on here you need to put on here that you need to know your cycle

**Student 7:** Like I knew mine(cycle) wasn’t right and when we were trying and I knew that the days I had to try were on the 14\textsuperscript{th}, 15\textsuperscript{th} and 16\textsuperscript{th} because my periods were not 28 days apart they were 31 days apart, but at first I didn’t know that and we kept trying on the 11\textsuperscript{th} and 12\textsuperscript{th} days and we weren’t getting pregnant, so you have to go back and you have to know exactly by testing it out for a few months to know ok well this month I was 28 days
and this month I was like 32 and the next one I was like 29 so you need to make sure you know if you are consistent, ‘cause I’m not.

**RESEARCHER:** I needed to know that because no one else had mentioned that and with the two of you, you have experience that will help me to know what will make it better.

**Student 8:** I am more regular now, but when I was younger I was not.

**RESEARCHER:** Ok, thank you very much, anything else? Thanks again and here are your gift cards.
STUDENT 9

RESEARCHER: State your sex and age please

Student 9: Female, 41

RESEARCHER: And in your class, which of these diagrams did I present to you?

Student 9: This one (points to the calendar)

RESEARCHER: And looking at this picture can you tell me when pregnancy should?

Student 9: Should be somewhere around the 13th-15th

RESEARCHER: And when should it not happen?

Student 9: Smiley Faces (laughs)

RESEARCHER: What do you think was the most important thing that you got from this presentation?

Student 9: Believe it or not, I did not know that the male sperm, stayed in the female that long… I have to go is this it?

RESEARCHER: This will work, thank you very much, have a good day

Student 9: Ok
RESEARCHER: State your sex and age please

Student 10: Male, 19

RESEARCHER: Now this is the diagram that you saw in your class, from this diagram do you remember anything about when pregnancy should and should not occur?

Student 10: Um, let’s see, I think that the red triangles you had a small chance of getting pregnant and these were larger chances (points to male/female symbols), the smiley faces are when you’re safe to have sex and I don’t know what the black ones are

RESEARCHER: Black represents when she is on her period. Was there is anything from this diagram that you told someone else?

Student 10: ummm, not really..

RESEARCHER: Did this change your reproductive health decisions at all?

Student 10: Well, it’s kinda of… this is whenever, I think that right before a woman starts is the safest time because that is whenever the egg is like stale, that is one that I remember and I told some people that the safest time is right before

RESEARCHER: Right before what?…

Student 10: Right before she starts her period, cycle (laughs), it’s that recorder, that thing is messing me up

RESEARCHER: Don’t think about it, it is just me and you talking

Student 10: I mean like you know they know when it going to happen so maybe like a week before she starts is the best time and decreases the chance when she can get pregnant and I never knew that before I saw this in class
RESEARCHER: Is there anything from when you saw it the first time, that now makes certain things stick out to you so if you saw this?

Student 10: I have no idea what that means but with this one, the smiley faces is like the good times

RESEARCHER: So is it the symbols that you help recognize what is going on?

Student 10: Yeah, like this is more confusing (linear) but this one (calendar) looks like it could be both ways, like if you are trying to get pregnant or not get pregnant, because this there is no negative aspect of this diagram (calendar)

RESEARCHER: Do you think that is good for the diagram or bad for the diagram?

Student 10: Like me I would be trying to get pregnant but if you were then you can use it, it’s like doesn’t show like a negative side, like if there were a big red “x” to show that is was bad, it’s not like frowning upon it if you choose to do it

RESEARCHER: So you’re saying that it does not make you feel as you shouldn’t be, like it’s ok and this is what you should know

Student 10: It’s like tells both sides because there are no fingers being pointed at you and you can see when to do it and when not to do it, It’s easier to hand out because for example an abortion clinic might hand out one that has these with frowning faces instead of smiley faces

RESEARCHER: That is a new look at this and I thank you for your insight.
RESEARCHER: State your sex and age please

Student 11: Female, 18

Student 12: Male, 20

Student 13: Female, 18

Student 14: Female, 18

RESEARCHER: Which diagram did you see in your class?

Student 11: Calendar

Student 12: Calendar

Student 13: Calendar

Student 14: Calendar

RESEARCHER: When is pregnancy most likely to occur? And why did you pick these days?

Student 11: Days 7-15 because contraception alert and fertile days so that’s when pregnancy can occur most likely

Student 12: Days 7-15, red triangles, symbols and key that informs you

Student 13: Days 7-15; they stand out a lot more red triangles

Student 14: Days 7-15 because of answer key (legend). It stands out from everything else

RESEARCHER: What was the most valuable concept that you learned?

Student 11: Days that someone can get pregnant because you know that most people don’t know, like their ovulation days and stuff like that so I think
**Student 12:** I learned when to be a lot more careful with my life and I was able to help my sister out because she is trying to have a baby and tell her when she can

**Student 13:** Just the days like how my month goes and the days when you can and cannot get pregnant

**Student 14:** Basically, it would help like which days we should be aware of to be ok

**RESEARCHER:** Now look at this diagram and tell me the difference that you notice from the calendar?

**Student 11:** I think the calendar is easier to read than the other one (linear) and I don’t get the graphs…

**Student 12:** Just looking at it is confusing

**Student 13:** This one is a lot more complicated than the other one and this one just lays it out there

**Student 14:** This one is easier to read and the other one has too many details

**RESEARCHER:** Is there anything that you think should be added to this to make it better?

**Student 11:** I pretty much think it is good, it is very informative and I don’t see anything that is missing

**Student 12:** It covers all bases but the ability to set it to an individual would be nice

**Student 13:** Pretty much explains everything, so I don’t see anything that should change

**Student 14:** I don’t see anything that you need to change either, because it gives details that you actually understand
**RESEARCHER:** So let’s say there was some sort of website, that allowed you to go in and to input your period or the woman’s period, do you think that would be helpful to you to know?

**Student 11:** Yeah!

**Student 12:** Very much! Can you get me that address right now?

**Student 13:** yeah!

**Student 14:** Yeah!

**RESEARCHER:** Ok, I am working out the kinks of one right now and to get it where it is more personable so you can know when the best times are depending on your lifestyle…. How will this affect your future reproductive health decisions? How will you sh

**Student 11:** I think that later on when I want to have kids, I can plan when I want and I do have like friends who have gotten pregnant and didn’t want to get pregnant so they could have you that to know when to and when not to have sex.

**Student 12:** Like I was saying earlier, it is great guide to let people know when they get married they will know when to and when to avoid it and then later on when it is time you know when to start

**Student 13:** Like I have friends who don’t want to get pregnant and they don’t know the days and it helps them to know so they can prevent unwanted pregnancies

**Student 14:** I have friends that have had pregnancy scares and they never know and this would help to not have a scare and prevent like you said unwanted pregnancies

**RESEARCHER:** I appreciate your time and your participation. Thank you very much and you can select your gift card.
STUDENT 15

RESEARCHER: State your sex and age please

Student 15: Female, 39

RESEARCHER: Have you had any type of sex education instruction?

Student 15: Can’t recall, but maybe in junior high school

RESEARCHER: Which diagram did you see first in your class?

Student 15: This one where it goes up the hill…

RESEARCHER: Using this diagram when is pregnancy most likely to occur?

Student 15: During days 12-15 (points to ovulation)

RESEARCHER: Using this diagram when is pregnancy most likely to not occur?

Student 15: Uhhh,, the only thing I remember is when you said after cycle starts over again… So I am going to say during this area (Points to the hormonal concentration panel)

RESEARCHER: What do you think was the most valuable concept that you learned from this diagram and presentation?

Student 15: The part where you said pieces of your uterus “falls off”, which days you begin or start and how long it goes for” (points to the endometrial lining panel of the diagram)

RESEARCHER: Now, look at this diagram,

Student 15: …Laughs

RESEARCHER: Why are you laughing?

Student 15: Because I remember this from a few semesters ago when you showed it and because I think it helps!
RESEARCHER: Why do you think it helps?

Student 15: It helps to let you know when you can get pregnant and when you can’t especially for those dying to have a child

RESEARCHER: What do think of this diagram compared to the other one?

Student 15: I think it is much more helpful because of the pictures and easier to follow and color coordination.

RESEARCHER: Do you think you will share this with anyone?

Student 15: Yes, everyone

RESEARCHER: How will this affect your future reproductive health decisions?

Student 15: ummm, it would help me to see when are the best days to get pregnant without having to try to hard (laughs)… that is if I have any eggs left… How is it that people get pregnant in their 50s?

RESEARCHER: It has to do with the individual woman?

Student 15: How can you find out if you have any left? Because I have not been regular lately?

RESEARCHER: You would have to visit your physician and have a consult with them about fertility…

Student 15: Ok, well thanks….

RESEARCHER: Thank you for your time and I appreciate your input.
STUDENT 16

RESEARCHER: State your sex and age please

Student 16: Female, 21

RESEARCHER: Have you had any type of sex education instruction?

Student 16: Yes, high school, it was just girls..

RESEARCHER: Which diagram did you see first in your class?

Student 16: Calendar

RESEARCHER: Using this diagram when is pregnancy most likely to occur?

Student 16: During days 11-15

RESEARCHER: Why did you select these days?

Student 16: Because in society and on movies they always say “she is ready” during those days.

RESEARCHER: Using this diagram when is pregnancy most likely to not occur?

Student 16: Menses but wait I am not sure… ok where the red triangles are….

RESEARCHER: Is there anything you prefer about this diagram?

Student 16: If gives you a key which makes it easy

RESEARCHER: Now, look at this diagram, What do you notice different about this one?

Student 16: It looks like it will take more time to figure out.

RESEARCHER: Do you think you will share this with anyone? Or how will this affect your future reproductive health decisions?

Student 16: I would use what I learned to communicate this information with teens

RESEARCHER: Do you have any suggestions for either diagram?
Student 16: No. I like the calendar.

RESEARCHER: Thank you for your time and I appreciate your input.
STUDENT 17

RESEARCHER: State your sex and age please

Student 17: Female, 35

RESEARCHER: Have you had any type of sex education instruction?

Student 17: Yes, elementary school, middle school, high school

RESEARCHER: Was it same sex or co-ed?

Student 17: It was same sex….

RESEARCHER: Which diagram did you see first in your class?

Student 17: Calendar

RESEARCHER: Using this diagram when is pregnancy most likely to occur?

Student 17: When the triangles are present on the calendar

RESEARCHER: Using this diagram when is pregnancy most likely to not occur?

Student 17: During the time right after your period

RESEARCHER: Is there anything you prefer about this diagram?

Student 17: No

RESEARCHER: Now, look at this diagram, What do you notice different about this one?

Student 17: To me it is easier to understand because of the panels

RESEARCHER: Do you think you will share this with anyone? Or how will this affect your future reproductive health decisions?

Student 17: It will not affect my reproductive lifestyle because I have had a partial hysterectomy and reproduction for me is a done deal… but I use this information to better inform my daughter.
RESEARCHER: Do you have any suggestions or comments for either diagram?

Student 17: The only thing is that the calendar seems not too practical for today’s lifestyles and preferences.

RESEARCHER: Thank you for your time and I appreciate your input.
RESEARCHER: State your sex and age please

Student 18: Male, 48

RESEARCHER: Have you had any type of sex education instruction?

Student 18: Yes, middle school

RESEARCHER: Was it same sex or co-ed?

Student 18: Co-ed

RESEARCHER: Which diagram did you see first in your class?

Student 18: Calendar

RESEARCHER: Using this diagram when is pregnancy most likely to occur?

Student 18: Triangle areas

RESEARCHER: Using this diagram when is pregnancy most likely to not occur?

Student 18: When the smiley faces are there, I used the legend

RESEARCHER: Why did you pick these days?

Student 18: Because I used the legend

RESEARCHER: Is there anything you prefer about this diagram?

Student 18: Yes, easier to read, simple format, requires less thought…

RESEARCHER: Now, look at this diagram, What do you notice different about this one?

Student 18: This one is more exact but somewhat confusing… it gives hormone levels and phases which is good
RESEARCHER: Do you think you will share this with anyone? Or how will this affect your future reproductive health decisions?

Student 18: ummm, No, No longer in reproductive mode….

RESEARCHER: Do you have any suggestions or comments for either diagram?

Student 18: Yes, color code menstruation days to red instead of black for blood, so no bias because some may not see it as a dark time…. And…. Make safe days black and white for same reason, no bias… oh and use yellow or orange for the alert days, like a caution sign.

RESEARCHER: Thank you for your time and I appreciate your input.
STUDENT 19

RESEARCHER: State your sex and age please

Student 19: Female, 21

RESEARCHER: Have you had any type of sex education instruction?

Student 19: Yes, elementary school, middle school, high school

RESEARCHER: Was it same sex or co-ed?

Student 19: It was just girls..

RESEARCHER: Which diagram did you see first in your class?

Student 19: Calendar

RESEARCHER: Using this diagram when is pregnancy most likely to occur?

Student 19: When the triangles are present on the calendar

RESEARCHER: Using this diagram when is pregnancy most likely to not occur?

Student 19: When you can have “fun” days

RESEARCHER: Is there anything you prefer about this diagram?

Student 19: The legend and it is easy to read…

RESEARCHER: Now, look at this diagram, What do you notice different about this one?

Student 19: To me it is harder to understand, too much stuff

RESEARCHER: Do you think you will share this with anyone? Or how will this affect your future reproductive health decisions?
Student 19: I have told young adults who are around the same age as myself. Plus, every woman should know all of this information. These charts should be taught when teenagers are being taught sex education.

RESEARCHER: Do you have any suggestions or comments for either diagram?

Student 19: No. I do not see anything that should be changed.

RESEARCHER: Thank you for your time and I appreciate your input.
**STUDENT 20**

**RESEARCHER:** State your sex and age please

**Student 20:** Male, 26

**RESEARCHER:** Have you had any type of sex education instruction?

**Student 20:** Yes, high school

**RESEARCHER:** Was it same sex or co-ed?

**Student 20:** It was co-ed

**RESEARCHER:** Which diagram did you see first in your class?

**Student 20:** Calendar

**RESEARCHER:** Using this diagram when is pregnancy most likely to occur?

**Student 20:** Ovulation phase

**RESEARCHER:** Why did you select this time?

**Student 20:** I used the colors in the key

**RESEARCHER:** Using this diagram when is pregnancy most likely to not occur?

**Student 20:** On the smile face days….

**RESEARCHER:** Is there anything you prefer about this diagram?

**Student 20:** Very user friendly

**RESEARCHER:** Now, look at this diagram, What do you notice different about this one?

**Student 20:** This one is more specific but still viable

**RESEARCHER:** Do you think you will share this with anyone? Or will this affect your future reproductive health decisions?
Student 20: I’ve always been really careful. I do like the smiley face and sharing with others is always good.

RESEARCHER: Do you have any suggestions or comments for either diagram?

Student 20: For the safe intercourse days perhaps another symbol would be better for widespread use.

RESEARCHER: Thank you for your time and I appreciate your input.
Student 21

Researcher: State your sex and age please

Student 21: Female, 35

Researcher: Have you had any type of sex education instruction?

Student 21: No

Researcher: Which diagram did you see first in your class?

Student 21: That one… but can we use the other one

Researcher: Why,

Student 21: It is easier to read…

Researcher: Let’s try this one and then we will try the other one… Using this diagram when is pregnancy most likely to occur?

Student 21: Ummm, here after your period? I am not sure…

Researcher: Why did you pick these days?

Student 21: Just seems right

Researcher: What about when pregnancy is most likely to not occur?

Student 21: When you are menstruating

Researcher: Ok, now let’s use the other diagram, Using this diagram when is pregnancy most likely to occur?

Student 21: Ok, I know this one, days 7-16

Researcher: Why did you pick these days?

Student 21: Because the legend says contraception alert

Researcher: Why did you pick these days?
Student 21: Because the legend says contraception alert

RESEARCHER: Using this diagram when is pregnancy most likely to not occur?

Student 21: Days 17-27

RESEARCHER: Why did you pick these days?

Student 21: because the legend says safe intercourse days

RESEARCHER: What do you think was most valuable concept you learned from this diagram?

Student 21: The most valuable concept I learned was that the fertile days can be 3 days before and 2 days after ovulation. I didn’t know that sperm can live for 5 days.

RESEARCHER: Which of the two diagrams do you prefer?

Student 21: The calendar because it is easy to follow and everyone can read a calendar…. And the symbols make it easy to know which days are safe and which days are fertile…

RESEARCHER: How will this affect your future reproductive health decisions?

Student 21: I will use this knowledge when trying to conceive. It will help me know which days are fertile and are more likely to conceive.

RESEARCHER: Will you share this information with anyone or have you already shared it with someone?

Student 21: I will use share this information with my husband because it is important for him to understand as well,

RESEARCHER: Do you have any suggestions or comments for either diagram?
Student 21: No, I wouldn’t change anything about the calendar.

RESEARCHER: Thank you for your time and I appreciate your input.
Student 22

RESEARCHER: Please state your sex and age

Student 22: Female, 25

RESEARCHER: Have you had any type of sex education instruction during your lifetime? If so when and where?

Student 22: Yes elementary, middle and high

RESEARCHER: Which diagram did you see first in your class?

Student 22: Linear

RESEARCHER: Using this diagram when is pregnancy most likely to occur?

Student 22: Around Ovulation

RESEARCHER: Why did you select this time?

Student 22: Because that when your egg is released

RESEARCHER: Using this diagram when is pregnancy most likely to not occur?

Student 22: While your cycle is on.

RESEARCHER: Why did you select this time?

Student 22: I just know that what your cycle means.

RESEARCHER: Now, look at this diagram, What do you notice different about this one?

Student 22: This one is straightforward no guessing.

RESEARCHER: Which diagram did you prefer?

Student 22: I like the calendar because it has the symbols but the other one is good too because you get to see the tissue.
RESEARCHER: How will this affect your future reproductive health decisions?

Student 22: I will be more careful and pay attention more to my cycle.

RESEARCHER: Do you think you will share this information with anyone?

Student 22: Yes, my friends and family members, I think the calendar is really neat.

I agree that boys should know too, so they do not always try to place the blame on the girls because they should both be blamed not just her.

RESEARCHER: Do you have any suggestions or comments for either diagram?

Student 22: Not really, just that the calendar is different from anything I have seen for helping know when to and when not to so you can not get pregnant.

RESEARCHER: Thank you for your time and I appreciate your input.
RESEARCHER: State your sex and age please

Student 23: Female, 65

RESEARCHER: Have you had any type of sex education instruction?

Student 23: Yes, at Precana Conference at the Catholic Church before I was married at age 18.

RESEARCHER: Which diagram did you see first in your class?

Student 23: Calendar

RESEARCHER: Using this diagram when is pregnancy most likely to occur?

Student 23: From the 11th - 16th days

RESEARCHER: Why did you select these days?

Student 23: One usually cannot become pregnant when on their menstrual cycle.

RESEARCHER: Using this diagram when is pregnancy most likely to not occur?

Student 23: Days 1-6 and days 28-30

RESEARCHER: Why did you select these days?

Student 23: One usually is not fertile right before their menstrual cycle.

RESEARCHER: What was the most valuable thing you learned about this presentation?

Student 23: It was good for younger people. They got to get a better understanding about their bodies and how to keep them from becoming pregnant.

RESEARCHER: Now, look at this diagram, What do you notice different about this one? Do you think the difference is helpful?

Student 23: It shows follicular phase, luteal phase, estrogen and progesterone phases.
It is helpful in understanding the cycle.

**RESEARCHER:** Which of the diagrams do you prefer?

**Student 23:** I like the second one (linear) it is more detailed than the one presented in class. There is more detail for one to study in order to get a better understanding of our cycles.

**RESEARCHER:** How will this affect your future reproductive health decisions?

**Student 23:** I no longer have to worry about reproductive health, but will it will certainly be useful in answering the many questions that I am faced with daily from my 12, 14 and 18 year old granddaughters.

**RESEARCHER:** Will you share this information with anyone? Why or Why not? If you have already shared this information, please list with whom and why you shared it with this person.

**Student 23:** As I mentioned before, I will talk to my young granddaughters about this. All young girls should be informed, at an early age, of the chances of becoming pregnant. I will also show it to their mothers so they can have good information in advising their daughters of the possibility of becoming pregnant.

**RESEARCHER:** Do you have any suggestions or comments for either diagram?

**Student 23:** No I think it was very well though out because we were given two ways to learn about our bodies.

**RESEARCHER:** Thank you for your time and I appreciate your input.
STUDENT 24

RESEARCHER: State your sex and age please

Student 24: Female, 31

RESEARCHER: Have you had any type of sex education instruction? When?

Student 24: Yes, 4th and 6th grade, church at age 16

RESEARCHER: Which diagram did you see first in your class?

Student 24: Linear

RESEARCHER: Using this diagram when is pregnancy most likely to occur?

Student 24: During ovulation

RESEARCHER: Why did you select this time?

Student 24: Ovulation is the most fertile time

RESEARCHER: Using this diagram when is pregnancy most likely to not occur?

Student 24: Menstruation

RESEARCHER: Why did you select this time?

Student 24: The uterine lining is shed at this time and egg is released

RESEARCHER: What was the most valuable concept that you learned?

Student 24: I knew the concepts but a good reminder.

RESEARCHER: Now, look at this diagram, What do you notice different about this one?

Student 24: Obvious difference in appearance, the other diagram worked better for me… not saying that this one is bad

RESEARCHER: Which diagram did you prefer?

Student 24: The one in class (linear) was more bold and easier to digest…
RESEARCHER: How will this affect your future reproductive health decisions?

Student 24: It will not affect my reproductive lifestyle because I am unable to reproduce…

RESEARCHER: I am sorry to hear that…

Student 24: … Due to early female problems…

RESEARCHER: Do you think you will share this information with anyone?

Student 24: I may share it, I am unsure. I am a non-traditional, older student and typically this subject does not surface with my peer group. It may however be helpful with younger family members.

RESEARCHER: Do you have any suggestions or comments for either diagram?

Student 24: No

RESEARCHER: Thank you for your time and I appreciate your input.
STUDENT 25

RESEARCHER: Please state your sex and age

Student 25: Female, 29

RESEARCHER: Have you had any type of sex education instruction during your lifetime? If so when and where?

Student 25: Yes, I have had sex education during elementary, middle and high school. 1986-1995

RESEARCHER: Which diagram did you see first in your class?

Student 25: Linear

RESEARCHER: Using this diagram when is pregnancy most likely to occur?

Student 25: During ovulation

RESEARCHER: Why did you select this time?

Student 25: That is what I learned during the presentation

RESEARCHER: Using this diagram when is pregnancy most likely to not occur?

Student 25: During menstruation

RESEARCHER: Why did you select this time?

Student 25: That is what I’ve been taught.

RESEARCHER: What was the most valuable concept that you learned?

Student 25: How to calculate when you are most fertile

RESEARCHER: Now, look at this diagram, What do you notice different about this one?

Student 25: Which hormones are at the highest during which time.

RESEARCHER: Which diagram did you prefer?
Student 25: I think the one I saw in class (linear) is easier to read because it gives you a variety of information from the thickness of your uterine wall to the hormone levels in your body. It is also easy to interpret. I think men and women should know how our reproductive system works.

RESEARCHER: How will this affect your future reproductive health decisions?

Student 25: I have already thought more about it. I will start trying to have my own baby in about 6 mos. I already have a 13 yr. old step-daughter, who I spoke with about this, so she can be informed.

RESEARCHER: Do you think you will share this information with anyone?

Student 25: Hollie, my step-daughter, because she recently started her menstrual cycle; Richard, my fiancé, because we will be trying to have our on child, and I was trying to explain the ovulation period.

RESEARCHER: Do you have any suggestions or comments for either diagram?

Student 25: Actually, I think it went well. I was surprised how no one felt inhibited to talk about the subject. I thought students asked very real questions that affect them.

RESEARCHER: Thank you for your time and I appreciate your input.
Student 26

RESEARCHER: Please state your sex and age

Student 26: Female, 19

RESEARCHER: Have you had any type of sex education instruction during your lifetime? If so when and where?

Student 26: Yes, middle and high school

RESEARCHER: Which diagram did you see first in your class?

Student 26: Linear

RESEARCHER: Using this diagram when is pregnancy most likely to occur?

Student 26: Ummm, when you ovulate, I think.

RESEARCHER: Using this diagram when is pregnancy most likely to not occur?

Student 26: When a girl is on her period

RESEARCHER: Why did you select this time?

Student 26: That is what I know happened when I am on my period

RESEARCHER: Now, look at this diagram, What do you notice different about this one?

Student 26: The pictures

RESEARCHER: Which diagram did you prefer?

Student 26: This one (calendar) is better because a girl can know what is really going on

RESEARCHER: How will this affect your future reproductive health decisions?

Student 26: I know when to be extra careful because I cannot have any kids right
now. It’s too hard.

RESEARCHER: Why do you say that?

Student 26: ‘Cause I know girls that do have a kid at my age and they have to deal
with a lot of drama and stuff

RESEARCHER: Like what

Student 26: You know because you have to study and deal with kid stuff and baby
daddy stuff and I cannot handle all that now

RESEARCHER: Do you think you will share this information with anyone?

Student 26: Yes! With my friends ‘cause I think they should know too how they can
be careful. This is so easy to get it and know too.

RESEARCHER: Do you have any suggestions or comments for either diagram?

Student 26: No just that it’s a good thing.

RESEARCHER: Thank you for your time and I appreciate your input.
Student 27

RESEARCHER: Please state your sex and age

Student 27: Male, 19

RESEARCHER: Have you had any type of sex education instruction during your lifetime? If so when and where?

Student 27: Yeah, I think maybe middle school or high school.

RESEARCHER: Which diagram did you see first in your class?

Student 27: This one with the pictures.

RESEARCHER: Using this diagram when is pregnancy most likely to occur?

Student 27: On the triangles

RESEARCHER: Using this diagram when is pregnancy most likely to not occur?

Student 27: When a girl is on her period

RESEARCHER: Now, look at this diagram, What do you notice different about this one?

Student 27: The smile face, this is the easy one

RESEARCHER: Which diagram did you prefer?

Student 27: This one (calendar) is better because if you know when a girl is havin’ her period then you can know when to... uhhh you know what I am talking about.

RESEARCHER: How will this affect your future reproductive health decisions?

Student 27: It’s like I just said, if I know then I can when to... you know

RESEARCHER: Ok, I think I get it

RESEARCHER: Do you think you will tell anybody about how to know when?
**Student 27:** Most def! I mean my boys need to know this so they don’t get caught up with some girl. ‘Cause some girls are out to get you knowing you don’t want no kids right now. It sucks when girls do that. I mean I ain’t saying kids are bad but it is not fair when she knows and she tries to get pregnant.

**RESEARCHER:** Well, what if she does not know when and in your case the time when to have intercourse and not get pregnant?

**Student 27:** Well she needs to get one of these here or try to find out or something. I mean it happenin’ to you so you should know

**RESEARCHER:** So are you saying a boy shouldn’t know too?

**Student 27:** No ‘cause us boys should know but girls should know even better

**RESEARCHER:** Do you have any suggestions or comments for either diagram?

**Student 27:** No just give it to errybody and tell’em use this!

**RESEARCHER:** Thank you for your time and I appreciate your input.
Student 28

RESEARCHER: Please state your sex and age

Student 28: Male, 20

RESEARCHER: Have you had any type of sex education instruction during your lifetime? If so when and where?

Student 28: Uhhh, high school

RESEARCHER: Which diagram did you see first in your class?

Student 28: The one with the fun days on it

RESEARCHER: Using this diagram when is pregnancy most likely to occur?

Student 28: When these red things are here and after her period

RESEARCHER: Using this diagram when is pregnancy most likely to not occur?

Student 28: When a girl is on her period

RESEARCHER: Now, look at this diagram, What do you notice different about this one?

Student 28: It is more complicated.

RESEARCHER: Do you think you can point out the same events on this one like the calendar?

Student 28: Don’t know but probably no.

RESEARCHER: Why not is it the same information and we went over this one in class too?

Student 28: Ok, Maybe, just go over it again and use the fun days to explain it too,

RESEARCHER: Well, I guess it is not hard to know which diagram did you prefer?
Student 28: Nope, it’s hands down this one (calendar).

RESEARCHER: How will this affect your future reproductive health decisions?

Student 28: Well, when I decide to have intercourse, I will use protection and know enough about the girl so she will be honest with me about where she is on the calendar.

RESEARCHER: Do you think you will tell anybody this fun day calendar as you call it?

Student 28: Sure, because no one ever tells you this much. It’s just use a condom and don’t get girls pregnant until you are ready for kids. I have never been told how to not get a girl pregnant.

RESEARCHER: Thank you for the insight!

Student 28: No problem because now I can tell my guy friends and girl friends to how to do things the right way. And thanks too for the life of sperm information, that was great!

RESEARCHER: Do you have any suggestions or comments for either diagram?

Student 28: Yeah, just maybe make the symbols bigger in size and….that’s it.

RESEARCHER: Thank you for your time and I appreciate your input.
Student 29

RESEARCHER: Please state your sex and age

Student 2: Male, 23

RESEARCHER: Have you had any type of sex education instruction during your lifetime? If so when and where?

Student 29: Yes ma’m in high school.

RESEARCHER: Which diagram did you see first in your class?

Student 29: I think you called it the calendar.?

RESEARCHER: Using this diagram when is pregnancy most likely to occur?

Student 29: A week or two after her period

RESEARCHER: Using this diagram when is pregnancy most likely to not occur?

Student 29: Of course when she is on her period,

RESEARCHER: Now, look at this diagram, What do you notice different about this one?

Student 29: There is a lot more details and information here compared to the other one.

RESEARCHER: Which diagram did you prefer?

Student 29: Both seem like good ones but the calendar is easy because I get it right away not too much knowledge needed because you have those pictures on there.

RESEARCHER: How will this affect your future reproductive health decisions?

Student 29: ummm, a lot because when the girl that I am dating is on her period, then
I can know which days to be extra careful or guess just not do it and when
days I should not have to worry about it

RESEARCHER: Do you think you will tell anybody what you have learned?

Student 29: Yes, my friends and I think I might ask the girl that I am with to point
out where she is on here. Can I get some extra’s of these? Oh and I just
thought of this, I maybe able to use this in dating to show that I am up on
girl stuff. Good one.

RESEARCHER: Ok, that is new to know you plan to use the calendar against the
girl… The things guys come up with.

Student 29: Well, I was always taught the more you know about the girl, the more
she will let you know about her (smiles).

RESEARCHER: Do you have any suggestions or comments for either diagram?

Student 29: No just don’t let girls know my new plan (laughs)

RESEARCHER: Thank you for your time and I appreciate your “player” input.
Student 30

RESEARCHER: Please state your sex and age

Student 30: Male, 21

RESEARCHER: Have you had any type of sex education instruction during your lifetime? If so when and where?

Student 30: Not really unless you count what I heard from my friends…

RESEARCHER: Ummm, that is some but I am not sure how accurate the information of your friends might be. This exercise will tell me though, ok next question, which diagram did you see first in your class?

Student 30: That one (calendar)

RESEARCHER: Using this diagram when is pregnancy most likely to occur? Not what you know from your friends.

Student 30: Pregnancy can happen when is during the triangle time, ovulation or something?

RESEARCHER: Using this diagram when is pregnancy most likely to not occur?

Student 30: It will not occur when she is on her period because that is just nasty, Ms. Mellieon. (frowns)

RESEARCHER: Thanks for that facial commentary. Now, look at this diagram, What do you notice different about this one?

Student 30: There are more things to learn about and the pictures are not there.

RESEARCHER: Which diagram did you prefer?

Student 30: The one with the pictures because I can use what my boys told me and
what you said and that way I am really safe from getting a girl pregnant.

**RESEARCHER:** How will this affect your future reproductive health decisions?

**Student 30:** A whole lot (smiles)

**RESEARCHER:** Why?

**Student 30:** Because Ms. Mellieon, I know what’s going on with the girl and I can say what happens too. I also know that some of the stuff my friends say may not be all the way true.

**RESEARCHER:** Do you think you will tell anybody about how to know when?

**Student 30:** Yes a few guys that I hang around with.

**RESEARCHER:** Do you have any suggestions or comments for either diagram?

**Student 30:** No but I do want to say thanks for info and telling us the real truth.

**RESEARCHER:** Thank you for your time and I appreciate your input.
VITA

Francesca Maria Mellieon-Williams is a native of Plaquemine, Louisiana. She received her Bachelor of Science degree in biological sciences from Southern University and A&M College in Baton Rouge, Louisiana. She received her Master of Science degree in reproductive physiology from Washington State University in Pullman, Washington.

At an early age, Francesca had the passion to help others understand their health. She felt it was important that the patient always know and understand what was going on with their bodies, not just what the doctor reported to them. During her undergraduate years, she developed an interest in reproduction and this is what led her to pursue her master’s degree. She increased her knowledge on the physiological mechanisms of contraceptives and became interested in the incidence of sexually transmitted infections in teens and young adults. During her program at Washington State, she began her teaching career and was directed into a new profession—education.

Upon completion of her degree, she began her teaching career at Baton Rouge Community College. She taught biology lab and lecture and the same passion that began at Washington State was continued. Also during this time, she enrolled in a science education course at LSU and began to be exposed to the pedagogy necessary to excel as an effective science communicator. Projects from these courses were used to develop her dissertation which included her passion, reproductive health education. She enjoys teaching biology lab to both majors and non-majors. She was even asked by her students to present in the Last Lecture Series which is sponsored by the Student Government Association at Baton Rouge Community College.
Francesca’s dissertation focused on a redesign of the menstrual cycle diagram. The diagram was designed to serve two purposes – pregnancy prevention and natural family planning. In the future, she plans to develop an interactive website that allows persons to calculate their menstrual cycle as well as provide information on contraceptives, STIs and other reproductive health related issues.

Francesca is married to Abdalla Khalfani Williams. Francesca is the daughter of Harold and Sheryl Mellieon and the older sister of Jessica, Kristin, and Harold, Jr. She is also the daughter-in-law of Diana Lynn Williams and the sister-in-law of Hasani and Rhonda.

The degree of Doctor of Philosophy will be conferred at the August 2007 Commencement ceremony.