EFFECT OF A COMPUTER-BASED MULTIMEDIA EDUCATIONAL MODULE ON KNOWLEDGE OF THE MENSTRUAL CYCLE

Joan L. Moon

A Dissertation

Submitted to the Graduate College of Bowling Green State University in partial fulfillment of the requirements of the degree of

DOCTOR OF EDUCATION

December 2007

Committee

Judith Jackson May, Advisor

Dale Klopfer
Graduate Faculty Representative

Carlos Baptista

Patrick D. Pauken

Rachel A. Vannatta
ABSTRACT

Judith Jackson May, Advisor

The menstrual cycle is an intricate web of hormonal interactions within the female anatomy impacting a woman’s fertility, health, and sense of wellbeing and is considered the “fifth vital sign” (Halpin, 2006). Although an understanding of the menstrual cycle is fundamental to a woman’s awareness of her reproductive health, many seek healthcare without this basic knowledge. A woman needs to understand her cycle, be aware if it is not following the normal course and seek an opportunity to discuss her menstrual experience with her care provider. However, time constraints exist in the provision of patient education in our current healthcare delivery system. A review of the literature revealed that computer-based education has been shown to have advantages in the delivery of information. However, no studies were found regarding the use of computer-based education for teaching the menstrual cycle.

The purpose of the study was to examine the effect of a computer-based, multimedia, educational module on the level of knowledge of the menstrual cycle when compared to a written information module and a PowerPoint module. It was intended to test a patient education tool on the menstrual cycle that would engage women in healthcare decision-making. The study was framed within Starratt’s 1991 model of the ethics of critique, justice, and care.

Seventy-two college-aged, undergraduate students at a Midwestern university participated in the study which involved a pretest, an intervention, and a posttest experience. The students were randomly assigned to a computer-based multimedia educational module (C-bmem), a written information module (IM), or a PowerPoint (PP) module intervention groups.
The interventions were similar in content and varied only in the manner of presentation with the C-bmem including animation and narration.

The hypotheses were:

1. There will be significant group differences in change in knowledge about the menstrual cycle in women who participate in the C-bmem relative to the IM and PP.
2. There will be a significant difference in the knowledge gained on the menstrual cycle between pretest and posttest for women in each treatment group.

The pretest results showed that knowledge of the menstrual cycle among the sample of women was minimal with the mean being less than 50%. Results showed there were no significant differences for hypothesis 1. However, there was statistical significance for hypothesis 2 in knowledge gained by all women in the treatment groups. Sixty-six of 70 respondents stated they would “most definitely” or “probably” use the information learned in the future. The value women placed on the experience and the fact that there was significant improvement in knowledge, coupled with the documented need for informed patients, supports the importance of providing women with education on the menstrual cycle. By teaching women about the menstrual cycle at their point of contact, i.e. the care provider’s office, women would be able to build on their existing knowledge thus facilitating informed decision-making.
It’s all about family

With love and gratitude to…….

Chuck

Chuck, Jr. & Michelle
Chelsey and Haley

Carrie & Mark
Brandon, Devan, Dalton

Betsy & Johnny
Baxter
ACKNOWLEDGMENTS

Appreciation is extended to all those who have entered my life on this journey. I would especially like to thank my chair, Dr. Judith Jackson May, whose guidance on my topic was of great value, Dr. Patrick Pauken for his attention to detail while at the same time challenging me to embrace the leadership perspective, Dr. Rachel Vannatta who patiently guided me through the methodology and results, and Dr. Dale Klopfer for his kind words with each communication and thoughtful reading and reflection on my work. Dr. Carlos Baptista, also on my committee, has been a valued friend and colleague for the last six years as we have collaborated on the educational module that was studied in this dissertation. Thank you for your continued support in the development of the module and serving on my committee.

I am grateful for my association with the University of Toledo College of Nursing for providing this education as a benefit to my employment. Without such support I would have never sought to accomplish a doctorate at this age of life.

The Northwest Ohio Chapter of the American College of Nurse-Midwives has supported me personally as well as providing a grant to help fund some of my dissertation needs. Their collaboration, encouragement, and friendship have helped me stay passionate about the women we serve. Thank you.

Friends have laughed with me, cried with me, and applauded me along my personal marathon. You know who you are. Thank you.

And, finally, to Chuck, Chuck, Jr., Carrie, and Betsye...Thank you for a beautiful life.
TABLE OF CONTENTS

CHAPTER I. INTRODUCTION ........................................................................................................... 1

Background of the Problem ........................................................................................................ 1
Knowledge of the Menstrual Cycle .......................................................................................... 4
Care Provider Leadership Styles ............................................................................................ 4
Methods and Effectiveness of Menstrual Cycle Education ................................................ 6
Time Constraints in Patient Education .................................................................................. 7
The Use of Computer-Based Education in Healthcare ......................................................... 8
Multimedia in Computer-Based Education ........................................................................... 8
Ethical Considerations ............................................................................................................ 8
Statement of the Problem ........................................................................................................ 11
Purpose of the Study ................................................................................................................ 11
Hypotheses .............................................................................................................................. 12
Definitions of Terms ................................................................................................................ 12
Significance of the Study ......................................................................................................... 13
Assumptions ............................................................................................................................ 14
Delimitations ............................................................................................................................ 14

CHAPTER II. LITERATURE REVIEW ............................................................................................ 15

Introduction .............................................................................................................................. 15
The Ethic of Critique ................................................................................................................ 16
Medicalization and Marketization .......................................................................................... 16
Knowledge of the Menstrual Cycle ......................................................................................... 22
Methods and Effectiveness of Menstrual Cycle Education.......................... 27
The Ethic of Care ........................................................................................................ 29
Caring Defined ............................................................................................................. 30
Servant-Leadership ..................................................................................................... 32
The Ethic of Justice ........................................................................................................ 34
Use of Computer-Based Education in Healthcare ................................................. 36
Multimedia Computer-Based Education ............................................................... 39
Multimedia Computer-Based Education and Other Types of Instruction .... 41
Summary ..................................................................................................................... 44
CHAPTER III. METHODOLOGY ............................................................................. 46
Introduction ................................................................................................................. 46
Participants ................................................................................................................ 46
Research Design ......................................................................................................... 46
Computer-Based Multimedia Educational Module (C-bmem) ..................... 47
Information Module (IM) ..................................................................................... 48
PowerPoint Module (PP) .................................................................................... 48
Instrumentation ........................................................................................................ 49
Participant Background Information (PBI) ....................................................... 49
Menstrual Cycle Knowledge Instruments (MCKI) .................................... 49
Procedures ............................................................................................................... 52
Data Analysis .......................................................................................................... 54
CHAPTER IV. RESULTS .......................................................................................... 56
Introduction ............................................................................................................. 56
LIST OF TABLES

Table | Page
--- | ---
1 Hypotheses, IV, DV, Covariate, and the Data Analysis Techniques Used | 55
2 Group Differences in Change of Knowledge About the Menstrual Cycle | 61
3 Analysis of Variance of the Change Scores | 61
4 Original and Adjusted Means of the Knowledge About the Menstrual Cycle Posttest by Treatment Group | 62
5 t-Tests and 95% CIs for the Change in Knowledge about the Menstrual Cycle From Pretest to Posttest for Each Treatment Group | 63
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Frequency of Choices Ranked First as for Source of Learning about the Menstrual Cycle</td>
<td>57</td>
</tr>
<tr>
<td>2</td>
<td>Frequency of Choices Ranked Second as for Source of Learning about the Menstrual Cycle</td>
<td>58</td>
</tr>
<tr>
<td>3</td>
<td>Frequency of Choices Ranked Third as for Source of Learning about the Menstrual Cycle</td>
<td>59</td>
</tr>
<tr>
<td>4</td>
<td>Frequency of Value of the Educational Session for Participant in the Future</td>
<td>60</td>
</tr>
</tbody>
</table>
PREFACE

In 1963, when I was a 19 year-old newlywed, I wondered about birth control. A physician for whom I worked told me about hormonal contraception. It seemed very foreign but he went on to say that it had been tested for 25-years and was the safest medication on the market. I chose not to use it. Shortly after that conversation, one of my friends from high school died from a massive stroke after being placed on oral contraceptive hormones. It was subsequently discovered that the amount of estrogen in contraceptive pills were, indeed, fraught with danger. Times have changed but we continue to read of women being placed on exogenous hormones that later prove to be problematic.

During my lifetime, I have not placed an exogenous hormone into my body. Years went by and, while in my reproductive years, I would notice subtle changes throughout my cycle but did not know their meaning. Many years later, after menopause, while studying to become a certified nurse-midwife, I learned about the menstrual cycle, its impact on reproduction, and the changes that occur throughout a woman’s life. As a healthcare practitioner, I was in a situation of prescribing hormones, either for birth control or perimenopausal symptoms, and realized that women had little knowledge about what they were putting into their bodies and how the hormones impacted their cycles. As a professor of women’s health nursing, I further realized the lack of knowledge that existed among young women, many of whom have been using hormones for years to prevent pregnancy.

As a participant in a Medical and Health Education Certification program at the Medical College of Ohio where I taught, I collaborated with Dr. Carlos Baptista and The Center for Creative Instruction to develop a computer-based, multimedia educational module for women to learn about their menstrual cycle so that they might be informed when making reproductive
healthcare decisions. This work has been a part of my life for the past six years and I feel blessed to have made an impact on the ability of some women as they claim their voice in healthcare decision-making through education of the menstrual cycle.
CHAPTER I. INTRODUCTION

Background of the Problem

The menstrual cycle is an intricate web of hormonal interactions in the female body impacting a woman’s fertility, health, and sense of wellbeing. Supporting human reproduction is a hallmark of the menstrual cycle. Fertility awareness is defined as observing and interpreting the signs resulting from the interplay of hormones in the menstrual cycle, and applying the information gained in self-awareness and reproductive healthcare decision-making (Pyper, 1997).

While a small number of women utilize fertility awareness in order to practice natural family planning, an understanding of the menstrual cycle is fundamental to all women’s attentiveness to their reproductive health (Clubb, Pyper, & Knight, 1987; Pyper, 1997). The literature shows that patients have a desire for information and involvement in decision-making (Ende, Lewis, Kazis, & Arlene, 1989; Nease & Brooks, 1992). Examples of informed decision-making related to fertility awareness include: (a) planning to become or not become pregnant, (b) understanding how hormonal contraception interrupts normal fertility, (c) knowing ways in which contraceptive methods fail if not used correctly, and (d) understanding how discontinuation of contraception impacts the return of fertility. Other areas in which fertility awareness is beneficial involve understanding: (a) the interruption of fertility with total breastfeeding, (b) how sexually transmitted diseases might impact a woman’s fertility, (c) the dynamics of infertility, and (d) the impact of hormonal fluctuations in the perimenopausal phase of life. The menstrual cycle hormones, estrogen and progesterone, have multiple effects on a woman’s physical and emotional well-being. Knowledge relative to how these effects may impact a woman’s overall health is important. Among the influences of estrogen are increased tissue elasticity and lubrication of the external genitalia, sustaining bone density, breast size,
promoting softer skin, and maintenance of a positive mood and memory. Other benefits around the time of ovulation include an increase in scores in psychological tasks, feeling more alert and increased sexual arousal. Some of the positive effects of progesterone include acting as an anti-inflammatory agent, helping regulate the immune response, decreasing gall-bladder activity, assisting vascular tone, thyroid functioning, bone building, and skin resilience, and fostering sleep (Condon, 2004; Lichtman & Papera, 1990).

There is consensus among leading healthcare professionals that the menstrual cycle is as much a vital sign as temperature, blood pressure, or pulse rate in the assessment of a woman’s overall health (Halpin, 2006). Except for young girls early in their reproductive lives, and perimenopausal women who might have irregular cycles, women should have a regular menstrual cycle which, for most women, falls within a range of 21 to 35 days (Condon, 2004). While some women express distaste of the actual menses, and experience self-consciousness in the necessary self-care activities, substantial research supports the premise that cyclical menstrual bleeding is an indication of wellness in a sexually mature woman (Anson, 1999; Roberts, Goldenberg, Power, & Pyszczynski, 2002). Committee Opinion 349 of the American College of Obstetrics and Gynecology (2006) states: “Using the menstrual cycle as an additional vital sign [for wellness in young girls and adolescents] adds a powerful tool to the assessment of normal development and the exclusion of serious pathologic conditions” (p. 1323). Adams and Deitch (2005) refer to the menstrual cycle as the fifth vital sign for college-age young women, and state the necessity for women to be aware of the parameters of “normal” which indicate overall good health. A menstrual cycle which falls outside those parameters might be a sign of a physical problem needing to be addressed. Although pregnancy is the main reason for cessation of menstruation, other causes interfering with menstrual cycle functioning
include eating disorders, exercise-induced amenorrhea, pituitary tumors, gonadal dysgenesis, and premature ovarian failure. Excessive bleeding can also be a sign of pathology.

As a woman ages, she can experience variations in menstruation which are due to fluctuating levels of estrogen and progesterone. She is in the perimenopausal phase of her life which can last for years. Her menstrual cycles become irregular in length and intensity with accompanying discomforts of hot flashes, vaginal dryness, and mood discomforts culminating in cessation of menses. After a woman has had no menses for one year, she has officially experienced “menopause”. She needs to know that pregnancy is still possible during the perimenopausal period, and she should also understand the risks and benefits of hormone replacement therapy.

A woman needs to understand her cycle, be aware if it is not following the normal course, and seek an opportunity to discuss her menstrual experience with her care provider. If a woman lacks knowledge on how her cycle functions, and her clinician does not value the importance of an intact cycle, significant consequences of poor communication and care related to an abnormal cycle can occur (Halpin, 2006).

Another reason women need to understand their cycle is because it is often seen as a condition needing to be fixed (Prior, 2004). Discomforts that accompany menstrual changes often are touted as “illnesses” that can be alleviated by pharmaceuticals (Caplan, 2004). According to Williams (1983), it seems imperative that menstruation be hidden both verbally and physically. Advertisements in popular magazines such as Redbook and Seventeen, show women in scanty white outfits with their arms thrust out, jumping in the air to celebrate the end of their periods (Chesler, 2006) while the subliminal message is that having a normal menstrual cycle, with menstruation, is a negative experience in women’s lives. The lack of knowledge
women have of their cycle can only compound the problem of the way women perceive their menstrual cycle and their ability to sort through the messages.

Knowledge of the Menstrual Cycle

Although an understanding of the menstrual cycle is fundamental to a woman’s awareness of her reproductive health, some seek healthcare without a basic knowledge of their cycle. The lack of knowledge makes it challenging for her to communicate with her care provider and understand reproductive healthcare information (Koff & Rierdan, 1995; Moore, 1995; Pyper, 1997). Knowledge of the menstrual cycle encompasses both scientific information about the anatomy and physiology of the cycle and management of self-care activities. While Brooks-Gunn and Ruble (1980) and Whisnant and Zegans (1975) found more than three-quarters of girls in the United States learn about menstruation in school health classes, menstruation education provided in school was criticized in studies for being confusing and incomplete by Koff and Riefdan (1995) and Kissling (1996). Menstrual cycle education frequently occurs as teaching from a physiologic perspective, in contrast to a more experiential i.e., self-care and understanding of the emotional aspects (Golub, 1983; Kieren, 1992).

A lack of knowledge, as well as previous experiences with menstruation, affects a woman’s attitude toward the menstrual cycle (McPherson & Korfine, 2004). In a study by Kissling (1996), when mothers counseled their daughters about menstruation, they emphasized attitudes about menstruation over actual subject matter information. Menstrual cycle attitudes can impact the effectiveness of future health care as a woman with a negative attitude about the menstrual cycle might be less likely to discuss it with her care provider.

Care Provider Leadership Styles

When women seek healthcare, they are basically doing so within a system of governance.
They are governed by whether or not they have health insurance and, if they have health insurance, they are governed by parameters of the insurance policy. They are governed by the medical system itself as they place themselves under the care of a provider. The literature shows that patients have a desire for information and involvement in decision-making (Ende et al., 1989; Nease & Brooks, 1992). Depending upon the leadership style of the provider, the patient may have a degree of self-governance in decision-making. However, if they enter the healthcare system without a basic knowledge of their menstrual cycle, the care provider might assume an authoritarian leadership role of selecting information and treatment provided as opposed to a model which leads to shared decision-making (Pyper, 1997).

Historically, the leadership role of the healthcare provider has been authoritarian by nature because of specialized information held and given to the patient who had less access to health information. Education given was what the provider wanted to share, power was held by the care provider, and compliance by the patient was an expectation after treatment was prescribed. For example, a care provider might determine oral contraception to be the best method of birth control for a woman. Without first exploring her knowledge base of how the pill works, assessing her attitude toward taking a pill daily, or understanding her ability to swallow pills, the choice could impact the woman’s compliance potentially resulting in an unplanned pregnancy.

In contrast, a shared decision-making model of care encompasses information identification, acknowledgment of patient values, and engaging dialogue (Charavel, Bremond, Moumjid-Ferdjaoui, Mignotte, & Carrere, 2001). This is an especially valid leadership style when one considers the fact that most reproductive healthcare is being provided to healthy women who are seeking to avoid pregnancy or alleviate menstrual discomforts not pathologic in nature. Shared decision-making is congruent with the theory of servant-leadership (Glickman,
Gordon, & Ross-Gordon, 2005) and involves strategies of service that identify the care provider and the patient as equals (Greenleaf, 1970). Each brings important aspects to the relationship. The care provider, as servant-leader, contributes professional knowledge and stewardship as manifested in listening, empathy, awareness, and a commitment to growth of the patient. The patient brings a past history, values, and a knowledge base of the menstrual cycle. For instance, if the woman understood the impact of ovulation on the menstrual cycle, the care provider could better discuss the physiologic action of progestin-only pills, which need to be taken at the same time each day in order to maintain stable hormone levels. Failure to do so might result in an unplanned pregnancy due to release of the egg by the ovary because of lack of hormonal control over ovulation. By understanding the menstrual cycle, the woman would recognize the need for compliance. She could be more involved in determining for herself whether or not her lifestyle allowed for the imperative consistency in taking the contraceptive hormone choice at the same time each day.

Methods and Effectiveness of Menstrual Cycle Education

Information about the menstrual cycle comes from a variety of sources including mothers, siblings, friends, pamphlets, healthcare providers, television, and school health classes. A major challenge in providing education to women about their health is doing so in an accurate and meaningful manner. Historically, educational pamphlets and booklets about the menstrual cycle have been inaccurate, biased, and have promoted product loyalty (Erchull, Emanuel, Gorman, & Johnston-Robledo, 2002). Health information for consumers is often written at reading levels that are much higher than the skills of the intended recipients (Davis et al., 1993), while spoken health information includes specialized language which is challenging for the audience to understand (Joos & Hickam, 1990). Teaching methods such as pamphlets and booklets tend to “place a greater emphasis on the negative aspects of menstruation than on the
positive aspects” (Erchull et al., 2002, p. 469) and over the course of the years, educational booklets have remained problematic in anatomical inconsistencies as well as being commercially driven. While no one denies the importance of patient education, the dilemma exists of what and how much information to provide the patient.

Time Constraints in Patient Education

Mechanic (1978) suggested that with the complex healthcare delivery system of the 1970s, one of the challenges in patient involvement in decision-making was that it was time-consuming and expensive to present patients with enough information to make informed decisions. The American model of healthcare has continued to change dramatically since that time as the structure has gone from a fee-for-service basis through private practitioners to a highly complex healthcare delivery system. These changes were the result of the healthcare industry experiencing the inability to keep up with rising expenses (Hood & Leddy, 2006). Still, practitioners are charged to provide clients “with information regarding healthcare decisions and the science regarding these choices to allow for informed decision-making” (American College of Nurse-Midwives, 2003, p. 2).

The provision of education is difficult especially in this era of managed care (American College of Nurse-Midwives, 2005). Often, patient education is not reimbursed by the insurance companies. Many visits are 10-15 minutes in length with some offices doubling up on appointment times in case patients do not keep their appointments. Even new visits are often 30 minutes in length and encompass a routine of taking a history, a review of systems, physical examination, problem identification and treatment plan. Little time is left for education which is often given as “just in time” teaching. The menstrual cycle is not formally taught (Personal communication with Beringer, Lamp, & Thomas, Sept. 30, 2007). In an effort to solve the dilemma of adequate patient education under time and financial constraints, healthcare providers
are recognizing the value of technology in patient education (Barak & Fisher, 2003; Lewis, 1999; Yarnall, Pollak, Ostbye, Krause, & Michener, 2003).

*The Use of Computer-Based Education in Healthcare*

The use of computer-based patient education has proven effective in a variety of health-related conditions. Research has demonstrated that education obtained through multiple learning channels, as provided by computer-based education, appears to facilitate sensory vividness and information enhancement when compared to a single channel, for example, brochures (Grueninger & Goldstein, 1990). In a literature review by Keulers and Spauwen (2003), the use of computer-based education has been found to be effective for healthcare education in a wide range of patient care areas.

*Multimedia in Computer-Based Education*

Over the years, the use of multimedia has become increasingly popular in computer-based education, especially the use of animation (Reiber, 1990). Retention of information through the use of interactive multimedia programs has been as high as 80% (Murphy, 1998). In 1990, Reiber contended that the technology to provide animation to the teaching/learning environment had not kept up with the ability to understand, from a scientific perspective, the effectiveness of such an innovation. A search of MEDLINE, CINAHL, and other education databases found no references to education of the menstrual cycle using a computer-based, multimedia approach and, subsequently, no literature was found where the research supports or negates the use of such an approach when educating about the menstrual cycle.

*Ethical Considerations*

The ethical dilemma identified in this dissertation was the lack of knowledge women have of the menstrual cycle which could impede healthcare decision-making. The dilemma was addressed using the framework of Starratt’s (1991) multidimensional model of the ethics of
critique, justice, and care. Originally developed for the profession of education, the model was adapted to the healthcare profession in this dissertation as a construct that could help care providers frame moral dilemmas encountered in practice. In the healthcare profession, there is an ethical responsibility to give appropriate care and “first do no harm”. Starratt (2004) identifies the same responsibility to do no harm for the profession of education but goes further by saying to “do good”. The researcher in this study viewed providing women with menstrual cycle education to promote informed decision-making as “doing good”.

The ethic of critique. The ethic of critique examines questions of social justice, human dignity, domination, power and the silencing of voices. In our society, the silencing of women’s voices regarding their menstrual cycle is inherent through the portrayal of the cycle as something shameful and necessary to hide rather than celebrate (Kissling, 2002; Treneman, 1989). Further, the lack of knowledge women have of their menstrual cycle silences them in informed decision-making.

In this dissertation, the ethic of critique spoke to the marketization and medicalization of women’s reproductive health, the lack of knowledge women have of their menstrual cycle, and the menstrual cycle educational materials that historically have been inaccurate and biased toward product loyalty and commercialization.

The ethic of care. The ethic of care is of value in women’s health because feminist research has shown that women’s lives are interconnected, interrelational and not hierarchical by nature (Gilligan, 1993). However, in receiving healthcare, there is often a hierarchical perception and unless the ethic of care is apparent the woman might feel her voice is silenced. Care is based upon relationships of absolute regard with no one person being of more worth than another. People have the right to be their authentic selves and to enjoy their lives as fully as possible. No one should benefit over the other in the relationship. People make an individual choice to care
but caring is “universal in its condemnation of exploitation and hurt” (Gilligan, 1993, p.74). The ethic of care is congruent with Greenleaf’s (1970) theory of servant-leadership. He describes servant-leadership as “increased service to others, a holistic approach to work, promoting a sense of community, and the sharing of power in decision-making” (p. 17). By respecting a woman’s right to gain knowledge about her menstrual cycle and use that knowledge in healthcare decision-making, the provider is exhibiting the ethic of care.

The ethic of justice. The ethic of justice attempts to resolve dilemmas raised by the ethic of critique. This is done by considering who governs, the rights and responsibilities of the parties involved, and problem solving to correct the wrongs identified through critique. The point is to act justly. In this study, there are layers of governance beginning with the healthcare industry who governs the payment system, the care provider who governs the care given to the patient, and the patient who self-governs through informed decision-making.

In this dissertation, the foremost premise of justice was that every woman has the right to be educated about her menstrual cycle. Further, she has the right to self-governance in her healthcare decision-making. As well, every woman should be assured that her healthcare provider is committed to recognizing her cycle as the “fifth vital sign” (American College of Obstetrics and Gynecology, 2003), and commits to bringing expertise in providing care for promoting wellness and evaluating pathology. With rights come responsibilities. Therefore, the woman has the responsibility to be aware of any variation which could be an indication of problems needing further evaluation. Such awareness demands knowledge of her menstrual cycle. The computer-based educational module studied in this dissertation was a tool the researcher developed in order to right the wrong of a lack of patient education about the menstrual cycle.
Statement of the Problem

Human reproduction is the hallmark of the menstrual cycle and the beneficial impact its cyclic hormones have on the wellbeing of women are numerous. Recognizing the value the ebb and flow of the cycle has on a woman’s body, it is often identified as the “fifth vital sign” (Adams & Dietch, 2005; Halpin, 2006). A menstrual cycle which is not following a normal pattern might be indicative of pathology. However, individual women, who should be the stewards of their cycles, are often silenced in their ability to participate in healthcare decision-making because of a lack of knowledge of the menstrual cycle and the negative messages about the cycle with which they are confronted in today’s society.

When women are not prepared to participate in decision-making because of lack of knowledge, or because of negative feelings associated with discussing their cycle, patient education might be dependent upon the leadership style of the practitioner as well as time and financial constraints. Also, educational materials on the menstrual cycle have historically been found to be inaccurate, biased, and used to promote consumer product loyalty. The use of computer-based education has proven effective in a variety of health-related conditions (Lewis, 1999); however, no studies have been found that examine a computer-based instructional approach to the menstrual cycle. The proposed study is intended to contribute to the body of empirical research to address the dilemma of ineffective and inadequate patient education on the menstrual cycle and to contribute to the practice setting by testing a computer-based educational module on the menstrual cycle.

Purpose of the Study

The purpose of this study was to examine the effect of a computer-based multimedia educational module (C-bmem) on the level of knowledge of the menstrual cycle when compared to an information module (IM) which was presented in a written format and a PowerPoint
module (PP) which was presented in a format similar to the IM but was read by the participant as a computer presentation. Another purpose was to examine the knowledge the participants had of the menstrual cycle upon pretest and knowledge gained by from pretest to posttest.

**Hypotheses**

1. There will be significant group differences in change in knowledge about the menstrual cycle in women who participate in the C-bmem relative to the IM and PP.
2. There will be a significant difference in the knowledge gained on the menstrual cycle between pretest and posttest for women in each treatment group.

**Definitions of Terms**

*Advanced practice nurse.* A nurse prepared at the Master’s degree level. In the State of Ohio, title protection is afforded for an advanced practice nurse in the role of Certified Nurse-Midwife, Nurse-Anesthetist, Nurse-Practitioner, or Clinical Nurse Specialist.

*Amenorrhea.* Absence of menstruation.

*Animation.* A computerized character designed to facilitate learning (Craig, Gholson, & Driscoll, 2002).

*Computer-based education.* The use of computers for patient education that offer either passive programs or interactive programs of instruction (Murphy, 1998).

*Computer-based multimedia educational module (C-bmem).* An instructional module about the menstrual cycle developed by the author in collaboration with colleagues at the Medical University of Ohio (Moon & Baptista, 2002). Originally used for nursing and medical students, it was adapted for the target population and includes updated animation and the use of narration.

*Endocrine.* “A gland that secretes directly into the blood system” (Venes, 2001, p. 700).
*Fertility awareness.* Observation and interpretation of signs resulting from the interplay of hormones within the cycle and applying the information gained in self-awareness and reproductive decision-making is known as “fertility awareness” (Roth, 1993).

*Menstrual cycle.* “The periodically recurrent series of changes occurring in the uterus and associated sex organs associated with menstruation and the intermenstrual period” (Venes, 2001, p. 1330).

*Menstruation.* “The cyclic, hormonally generated sloughing of the uterine endometrium which occurs between puberty and menopause and is accompanied by bloody vaginal discharge” (Venes, 2001, p. 1331).

*Menarche.* “The initial menstrual period, normally occurring between the 9th and 17th year” [of life] (Venes, 2001, p. 1325).

*Multimedia learning.* A setting where information is presented in two or more perceptual modalities such as auditory and visual (Craig et al., 2002).

*Postmenarchal.* The years following menarche and preceding menopause.

**Significance of the Study**

If findings suggest a significant change in knowledge from pretest to posttest for individual women or between treatments, healthcare leaders may use this knowledge to develop a plan for patient education using the information in the modules. If women who participate in the study value the experience, healthcare providers will benefit because they will have informed and satisfied patients thus optimizing shared governance in decision-making. This study will also be of value to the practitioner through efficient use of time resulting in cost containment. The patient will benefit as she is able to understand how her menstrual cycle functions, its impact on her body, and begin to govern her healthcare decision-making thus breaking the cycle of silence.
The study will benefit educators in a variety of settings where the menstrual cycle is taught, i.e. health education courses from junior high school through college.

Assumptions

Participants were female college students who were 18-years of age or older. It was assumed they were able to read at the 12th grade level, and had a desire to learn more about their reproductive healthcare. Because the C-bmem had voice over as well as printed text, it was assumed that the women in the experimental group were able to understand what was said. The researcher assumed that women who were interested in participating in the study completed written work to the best of their ability.

Delimitations

Time spent participating in the study might have been an inconvenience for women participating in the pretest/intervention/posttest. The women in the PP and IM groups did not have the benefit of narration or animation. Motivation could have been a limitation.
CHAPTER II. LITERATURE REVIEW

Introduction

Patient decision-making requires knowledge. In her conceptual model of emancipated decision-making in women’s health, Wittman-Price (2004) proposed that personal knowledge is one of the five attributes in the emancipation process. The manner in which we educate and inform women about their health and wellbeing may be an avenue to improve communication and knowledge, thus lifting the bonds of oppression in healthcare decision-making.

For almost a half-century, women have been placing exogenous hormones into their bodies in an effort to manipulate their menstrual cycle to prevent unplanned pregnancies. Often women have done so in a paternalistic system of medical care in which decisions are made by providers (Holmes, 2002) without patient participation. Although in today’s society, with easier access to information and changing social norms, decision-making between patient and provider has become one of a more shared process (Bunn, O’Connor, Tansey, Jones, & Stinson, 1997), research shows that women do not understand their menstrual cycle (Koff & Rierdan, 1995; Moore, 1995), thus impeding shared decision-making.

As well, educational materials on the menstrual cycle have been historically inaccurate, biased, and found to promote consumer product loyalty (Erchull et al., 2002; Havens & Swenson, 1989). In an effort to promote informed decision-making in women’s healthcare, the current study evaluated the effectiveness of a computer-based, multimedia, educational module (C-bmem) compared to an printed information module (IM) and a Power Point module (PP) on knowledge of the menstrual cycle.

The practice framework in this study was Starratt’s 1991 model of the ethics of critique, justice, and care entitled, “The Multidimensional Ethic at Work in a School Setting – An Ethical School Environment”. Originally developed for the educational setting, the model lends itself
well to the healthcare profession. The themes of critique, justice, and care are attributes which synergistically promote a rich response to ethical dilemmas faced by school administrators. These characteristics might, likewise, blend to promote a rich response to dilemmas faced by healthcare providers, most specifically, the lack of knowledge women have of the menstrual cycle which impacts their healthcare decision-making.

The Ethic of Critique

The ethic of critique examines who has power in a situation, what legitimizes it, and who defines it (Starratt, 1991). Power, a culture of silence and domination, class distinction, hierarchy, and privilege are some of the attributes examined. In 2004, Starratt spoke to “structural arrangements that need to be critiqued” (p. 29), in which he expressed that when unfairness in the application of a policy can be traced back to the policy, the structure of the policy must be critiqued because the fairness of the policy for all is questionable. An example he used was of earlier practices when women were disadvantaged just because they were women.

Medicalization and Marketization

An example of a structural arrangement needing to be critiqued related to women’s health was the long standing decision by American insurance companies to not pay for hormonal contraception. The reasoning was that prevention of pregnancy was not a disease. However, when Viagra, which was originally approved to treat mostly older men who had erectile dysfunction, came into high demand for younger men through direct marketing and was approved and paid for by insurance companies, lawmakers had a difficult time justifying payment for that drug while denying women the right to reimbursed compensation for hormonal birth (Goldberg, 1999). Individual state lawmakers examined the structure of reimbursement which resulted in contraceptive hormones being mandated by law to be paid by insurance companies in most states. The structure was changed.
Conrad and Leiter (2004) examined how changes have occurred in the structure of the United States healthcare system related to the influence corporations and insurers have had over the marketplace. They stated: “Medicalization occurs when previously nonmedical problems are defined and treated as medical problems, usually in terms of illnesses or disorders” (p. 158). “Medicalization” was identified as one of the most significant societal changes in the West over the last half of the past century especially as managed care has become dominant and the medical profession has seen declining power. The authors examined the creation of markets within the healthcare system and how these markets drive medicalization. Their thought was that important areas of medicalization are leaving the professional arena and going into the marketing arena. Two aspects of the medicalization of the market place are that prescription drugs are being marketed directly to the consumer and private medical markets are emerging. The authors presented the history of the medical profession that developed over the first three quarters of the 20th century, which was one of professional dominance (Freidson, 1970) and cultural authority (Starr, 1982) over health and illness. Because of marketing efforts, the authors stated that people now express less tolerance for symptomatic benign conditions resulting from otherwise simply uncomfortable physical conditions and are now interpreted as diseases. One area consumers are directly exposed to is the introduction of products to bring new people into the market by creating a product for which there has previously been no demand. Advertising that is presented directly to the consumer affects how people conceptualize a product and may influence consumers to seek the product.

An example of the marketization of a prescription drug for an “invented mental illness” related to the menstrual cycle is the drug Sarafem (Caplan, 2004). Sarafem is advertised widely to treat “Premenstrual Dysphoric Disorder (PMDD),” which has never been proven to be an actual disorder of the menstrual cycle. A precursor of PMDD was the term “premenstrual
syndrome (PMS)” which was coined in the 1960s to describe a number of symptoms associated with the menstrual cycle. Research to confirm the “diagnosis” has been fraught with methodological problems but the syndrome has continued to pervade society thus stereotyping women as being unraveled for at least part of their cycle. Postmenstrual Dysphoric Disorder was coined in the 1980s as a psychiatric diagnosis aimed at women who had more than five of the symptoms associated with PMS (feelings of sadness, tension or anxiety, mood swings, anger, disinterest in daily activities, trouble concentrating, fatigue, food cravings or binging, sleep disturbances, feeling out of control and physical symptoms such as bloating, breast tenderness, headaches, and joint or muscle pains [Ross-Flanigan, 2001]).

Serafem was put on the market to treat PMDD. Previously known as “Prozac”, a medication was used to treat depression whose patent was going to expire, the manufacturer gave it a new name and new set of symptoms for which it could be used, namely, treatment of PMDD. While both men and women experience mood swings (Rome, 1992), this was all of a sudden a disease of women (Caplan, 2004).

O’Meara (2001) concluded that Eli Lilly was unable to substantiate the diagnosis for PMDD for which they are marketing and selling Serafem to women. Gallant, Popiel, Hoffman, Chakraborty and Hamilton (1992) conducted research on experiences of symptoms identified with PMDD. Three groups of individuals participated. The first group consisted of women with severe symptoms, the second of women with no symptoms, and the third were men. The participants were instructed to keep track via a checklist of symptoms they experienced each day. The tracking of symptoms with the calendar is the same strategy used by practitioners to diagnose PMDD. The results of the research demonstrated there were no differences in the responses among the three groups. The addition of PMDD by the American Psychiatric
Association to the *Diagnostic and Statistical Manual of Mental Disorders (DSM)* was made without evidence-based research supporting the disorder to be valid (Caplan, 2004).

Research demonstrates that 84% of women who ask for a prescription drug from their physician leave the office with a prescription to fill (O’Meara, 2001). Although there are a small number of women who might benefit from Serafem, women are now seeking a prescriptive relief for normal discomforts that can be often be alleviated by nonpharmacological measures such as diet and exercise. A concern is that no medication is without side effects. It is the same drug as “Prozac” which has been known to cause, among other negative side effects, sexual dysfunction, increased appetite, nausea, headaches, and suicidal ideation.

The use of Serafem has raised ethical issues because on the one hand women feel like their symptoms are finally receiving the attention they deserve, while on the other hand, the therapist knows that the research has not concluded that PMDD is a real psychiatric disorder. So women are receiving “pathological” labels related to their menstrual cycle that are unsubstantiated by the research in order to sell pharmaceuticals (Caplan, 2004).

In June 2001, the Society for Menstrual Cycle, a group of multidisciplinary feminist scholars who understand the importance of the menstrual cycle in women’s health, passed a resolution requesting the Food and Drug Administration to “reconsider its approval of Serafem for the treatment of ‘Premenstrual Dysphoric Disorder’ and to ‘enjoin’ Eli Lilly from airing or publishing advertisements for Seraferm to lay and professional audiences until such reconsideration is completed.” (p. 1). This resolution was passed because the society, which was established in 1977 to focus on research on the menstrual cycle, found no empirical evidence of the existence of PDD and the use of Serafem could mask the “real causes of women’s suffering and the production of negative drug effects” (p. 1).
Reist (2007) spoke to the issue of women being presented with new types of surgery or pharmaceuticals to redesign themselves. Rather than accepting and celebrating their authentic selves, they are inundated with diet pills, cosmetic surgery, Botox, etc., which is usually meant to make someone else rich. She proceeded to discuss Lybrel, the pill to eliminate the monthly period. The title of the name is meant to imply “liberty” and she stated it is also meant to increase Wyeth’s bottom line with a projected profit of $250 million revenue. Her argument was that the long-term safety of the pill is unknown and any data that are available is very limited. Her concerns were echoed by The Society for Menstrual Cycle Research (2007) when, in its revised position statement, stated that the long term side effects, especially related to bone and cardiovascular effects, have not been researched adequately to support long-term menstrual suppression.

The injectable hormone, Depo-Provera, is given every three months to women for contraception or to women experiencing problematic uterine bleeding. It is a hormonal choice for women who do not wish to take the pill each day. However, studies now show that there are issues with bone density that might impact young women in the future. In the documentary film, *Period: End of Menstruation* (Chesler, 2006), Dr. Andrew Kaunitz states:

In our country there is lots of teen experience with Depo-Provera. We do need to continue study safety issues including bone health and we may have to wait until those teens literally become menopausal, certainly not during my professional career, before we can really answer than important question. But, until someone shows me bone health issues in menopausal women caused by injectable contraception, I am going to continue that it is a sound appropriate choice for teen candidates.

So, some in the medical community think that Depo-Provera is a sound, appropriate choice for the health of teenagers, and only after those young women reach menopause and
potentially have problems with the impact of osteoporosis on their health, the drug will be discontinued. This was only one person but it was said at a conference in front of many care providers who might then go home feeling secure in perpetuating the domination of women by subjecting them to a hormonal contraception that has not been proven safe over time. This is especially disconcerting because in 2004 Pfizer, the manufacturer of Depo-Provera, sent an official update stating that

Women who use Depo-Provera Contraceptive Injection may lose significant bone mineral density. Bone loss is greater with increasing duration of use and may not be completely reversible. It is unknown if use of Depo-Provera Contraceptive injection during adolescence or early adulthood, a critical period of bone accretion, will reduce peak bone mass and increase the risk of osteoporotic fracture in later life. Depo-Provera Contraception Injection should be used as a long-term birth control method (eg, longer than 2 years) only if other birth control methods are inadequate. (Pfizer, 2004)

Gilligan (1993) speaks to the voice women found with the legalization of abortion rights. For the first time, women were able to control their reproductive lives. However, according to Kissling (1996), women are not permitted to give voice to their menstrual cycle. Menstruation is to be concealed verbally as well as physically with advertisements showing the shame of menstruation and how they can help keep the process from being evident. Contemporary literature, both lay and medical, praise the lack of menstrual flow and, indeed, some are even proclaiming menstruation as useless (Coutinho, Segal, & Driscoll, 2002; Gladwell, 2000; Thomas, & Ellertson, 2000). Kissling (1996) states the taboo of laying claim to their menstrual cycle is the most powerful restraint related to the cycle placed on women.
Such a check on women’s voices can only be further perpetuated by a lack of knowledge. The final review of the literature within the ethic of critique speaks to the lack of knowledge women of all ages have of the menstrual cycle coupled with a history in this country of inaccurate and biased menstrual cycle educational materials.

**Knowledge of the Menstrual Cycle**

An understanding of the menstrual cycle is fundamental to a woman’s attentiveness to her reproductive health. A predominant theme in the menstrual cycle literature speaks to such a lack (Association for Reproductive Health Practitioners, 2006; Koff et al., 1995; Koff, Rierdan, & Stubbs, 1990; Moore, 1995). The literature identified studies related to menstrual cycle preparation from three perspectives: (a) how prepared women felt for menarche from both a biological and self-care standpoint (Golub & Catalano, 1983; Moore, 1995); (b) how prepared women actually were from an objective view (Koff & Rierdan, 1995); and (c) studies that include both subjective and objective perspectives (Koff, Rierdan, & Stubbs, 1990; Sievert & Dubois, 2005). In a survey compiled by the Association for Reproductive Health Practitioners (2006), it was found that many women did not know how their menstrual cycle functions and how exogenous hormones affect their cycles. Even though women who are on hormonal contraception do not experience a period when they are on the pill because the pill prevents ovulation, 67% felt they did have a natural period while on the pill. About 50% of the women felt that a 28-day cycle should occur each month. Attitudes toward the cycle were evident in the results that while 50% of the women felt their period was an indication of overall good health, 40% preferred not to have their period at all. The article proceeded to refer women to web sites where they could learn about menstrual suppression. It was discovered that this site was supported by Wyeth Labs, which has a vested interest in women seeking suppression of their
menstrual cycle as manufacturers of Lybrel, the first contraception to be marketed for total suppression of the menstrual cycle.

*Knowledge of young females.* The knowledge base of young girls and adult women was reviewed in an effort to demonstrate that a lack of knowledge of the menstrual cycle exists among women of all ages. In a study of 157 ninth-grade girls, Koff et al. (1995) explored the thoughts of postmenarchal girls about how they would help younger girls be prepared for menarche and what advice they would give mothers to help prepare their daughters. The researchers used a mixed methods design that included structured questions about the girls’ menstrual preparation, emotional responses to menarche, parents’ roles in preparation, and sources of information on the subject. Four open-ended questions were included about how the subjects felt their preparation for menstruation could have been improved. The results of the study indicated that the girls saw their mothers as important in menstruation education but felt the education was often inadequate. They also felt there should be less emphasis on the biological aspect and more on the self-care needs of the event. As well, the subjects stressed that menstrual cycle education should be longitudinal in nature beginning before menarche. The participants wanted physiology and hygiene to be placed in a larger psychological and sociological context in an effort to understand how their lives might be impacted by menstruation from both a social and personal perspective.

Another study of 86 sixth-grade girls by Moore (1995) evaluated the participants’ knowledge, beliefs and feelings about menarche and menstruation. The girls identified the amount of information about menstruation given to them by different sources such as mother, father, female relatives, friends, books, magazines, and other. The sources were rated as “gave me a lot of information about periods” (rated 2), “gave me some information about periods” (rated 1), and “gave me no information about periods” (rated 0) (p. 91). When computed, the
scores ranged from 0 to 14 (the highest being 14), higher scores meaning that the girls had more information from a wider range of sources.

The girls were also interviewed in order to assess their understanding of the anatomy and physiology of the menstrual cycle, perception of the social meaning of the cycle, and the psychological meaning. As noted in the study by Koff et al. (1995), mothers were the most frequent source of education related to the menstrual cycle. Only 24% of the girls correctly identified the fact that female athletes in heavy training and ballet dancers sometimes stop menstruating, while 80% stated that menstruation cleans the body of dirty blood. Eighty percent overestimated the amount of menses.

In a descriptive, comparative study, Hockenberry-Eaton and Richman (1996) compared mothers with their adolescent children on knowledge of basic sexual development terms. Ninety adolescents and 73 mothers defined terms related to sexual development which included menstruation, puberty, and ovulation. Answers were considered “correct, partially correct, or incorrect.” Although 87% of the mothers were able to define menstruation correctly, only 47% of the mothers defined ovulation correctly, 43% were able to define puberty, and 10% were able to define hormones correctly. Meanwhile, 66% of the female adolescents were able to define menstruation, while 26% defined ovulation, 43% defined puberty, and 6% defined hormones correctly. The findings support the current study in stating that the primary reason for preparing students related to their sexual development is to assist them in making reproductive healthcare decisions, however the results of the study showed a lack in such knowledge.

Knowledge of college-age females. In an effort to evaluate the knowledge of college-age students, Koff et al. (1990) conducted a study to examine women’s knowledge and perception of the menstrual cycle. The researchers hypothesized that women would have inadequate knowledge about the menstrual cycle but would know more about menstruation than about
ovulation or menopause because of the attention paid to the negative aspects of events as highlighted in popular literature occurring during the days around or during menstruation. Eighty college women completed a questionnaire consisting of subjective and objective questions about the menstrual cycle. Responses about the cause of menstruation were given correctly by 41% of the subjects. Sixteen percent stated that the lining of the uterus was related to menstruation while 9% were able to discuss the unfertilized egg. Menstruation was defined vaguely, incorrectly, or irrelevantly by 33% of the participants. Sixty-nine percent of the participants were able to define ovulation correctly. Seventy percent were able to state minimally accurate answers to questions about menstruation and ovulation. While most respondents were able to identify menopause as the cessation of menses, they were not able to discuss hormonal changes across the menstrual cycle. Only one person was able to marginally demonstrate an understanding of the fluctuation and role of hormones across the cycle.

The results supported the hypothesis that knowledge of the menstrual cycle is not adequate, especially related to menstruation, ovulation, and the role of hormones. The roles of estrogen and progesterone were poorly understood as well as the sequencing of cycles. The importance of the Koff et al. (1990) study speaks to the need to provide basic menstrual cycle education not only to young girls but to adult women as well. By providing such education, women would better understand their reproductive functioning and gain ability in reproductive decision making including increasing communication with healthcare providers.

In response to requests from medical students, a contraceptive learning package was developed by Abraham and McBride (2000) to assist them in understanding and practicing counseling skills to use when teaching contraception and related topics. There was a basic assumption by the faculty that the students had basic hormonal knowledge of the menstrual cycle prior to their involvement in the educational experience; however, when the students rated the
educational package as “average” that assumption was found to be inaccurate and the students requested to be taught the menstrual cycle as a part of the educational experience.

Knowledge of middle-aged females. In a study of 70 women between ages 18 and 22 and 67 women between 30 and 45, Golub and Catalano (1983) sought to assess whether or not the menarcheal experience would have an effect on later attitudes and experiences with menstruation. The hypothesis was that if the subjects’ preparation for menarche was positive, the participants would have less menstrual distress in the future. The subjects filled out a questionnaire containing both open-ended and multiple choice questions including remembrance of menarche, expectations at menarche, perceptions of preparation for the experience, reaction to their first menstruation, and symptoms of menstrual distress. Results showed that almost all the women could remember their first period including where they were and what they were doing. A significant relationship existed between how positive the younger age group’s experience was and their reaction to their first menstruation in Group 1 (ages 18-22). The hypothesis was not supported in that the adequacy of preparation did not relate to the subjects’ current attitude toward their menstrual cycle.

The importance of ovulation signifies an intact menstrual cycle. Sievert and Dubois (2005) conducted a study of 36 women ages 18-46 to see if women who thought they knew when they ovulated were able to identify ovulation by subjective signs. The women were instructed to one or more subjective signs of ovulation such as changes in basal body temperature, cervical discharge, abdominal pain, and change in libido and mood. The subjects provided urine samples for 5 days which were tested for a surge of luteinizing hormone (LH). Eighty-seven cycles were studied and of those only 42.5% were found to correlate with the subjective findings and an LH surge. When basal body temperature was removed from the participants’ subjective criteria the results dropped to 28%. The researchers concluded that most motivated women in the study were
correct only about half the time which shows that women are unrealistic about how well they know their cycle.

None of the studies cited were able to demonstrate that women of any age understood the most basic terms as well as hormonal or cyclic events of their menstrual cycles. None of the studies found or reviewed were involved with actual education about the menstrual cycle and were, therefore, unable to assess what women were able to learn when given an opportunity to increase their knowledge. Neither did the studies research examine the value women placed on the opportunity to increase knowledge about the menstrual cycle.

Methods and Effectiveness of Menstrual Cycle Education

Although mothers and female friends are responsible for much of the education on the menstrual cycle, a study by Koff and Rierdan (1995) found that 61% of women studied also received information about menstruation from commercially prepared booklets. Studies have shown through the years that written material is not always complete or unbiased. For instance, in 1975, Whisnant and Zegans (1975) reviewed seven booklets on menstruation that were produced in the 1970s by menstrual cycle product companies. Technical medical terms were used to describe the physiology of the menstrual cycle but otherwise the booklets were couched in vague and mysterious terms. The interplay of hormones was not discussed. Anatomical features were distorted and not appropriately placed within the abdominal cavity. External genitalia were not discussed and menstruation was depicted as an event that needed to be concealed.

In a later study, a content analysis of educational media about menstruation was reported by Havens and Swenson (1989). The researchers evaluated 31 educational films, videos, and slide/tape presentations on the menstrual cycle from both the physiological and self-care aspect. Physical aspects of menstruation were a part of the examination of the materials. Results showed
that most of the media (n = 30) depicted the female anatomy through the use of abstract, animated images while none showed actual photographs of the reproductive system. While the physiology of reproductive development was described accurately in all the programs, some showed distorted sizes and colors of the reproductive organs as well as varied depth of discussion of the menstrual cycle. The development of the reproductive system from infancy to adulthood was only discussed in four of the programs while a majority spoke to the process in relation to development during puberty.

Looking for improvements over time in more direct scientific detail and more anatomical correctness, Erchull et al. (2002) conducted a content analysis of 28 menstruation education booklets prepared by manufacturers of menstrual hygiene products between 1932 and 1997. A coding instrument was developed to examine how accurate the illustrations were, how clear the text was, and the amount and value of the facts. Results indicated that most booklets prepared for educational purposes between 1932 and 1997 were written by manufacturers who presented information about pubertal changes and hoped to achieve product loyalty by promoting the products of the company. Characteristics of the menstrual cycle were in all of the booklets. While menstrual hygiene and menstruation were the main themes, little information about the personal experience of menstruation or the composition and color of menstrual flow was given. Realistic anatomy was not depicted and physiology was not adequately covered over the course of time although there was an improvement in accuracy and a more positive approach. Fewer than 50% of the booklets mentioned estrogen and progesterone and the terms ovulation and menstruation were not used in some of the booklets. Many of the books avoided any discussion of potential pregnancy.

While previous studies focused on formal educational materials geared specifically to menstrual cycle education, Kalman (2000) analyzed articles about the menstrual cycle in popular
teen magazines aimed toward girls ages eleven to fourteen years to determine the quality and value of information about the menstrual cycle. Only five articles over a five-year time period were found. Kalman felt this might have been because four of the five articles focused on physiology and the editors may not have wanted to go further with the subject. Self-care activities were not mentioned in four of the five articles. After finding that negative attitudes about menstruation were perpetuated which could result in shame and embarrassment, the authors admonished editors of lay literature to recognize and promote the menstrual cycle and menstruation as normal life events.

The ethic of critique examined the power in our healthcare delivery system of medicalization and marketization as women have been silenced about their menstrual cycle through marketing the menstrual cycle and events surrounding it as pathological in nature. Compounding the silencing is the lack of knowledge women have of the menstrual cycle and inadequate educational materials on the menstrual cycle. The ethic of care follows as the discussion moves from one critiquing a system of healthcare and education to what can be provided to women as they seek to become informed decision-makers.

The Ethic of Care

Within this section, attributes of the ethic of care are discussed in relationship to how servant-leadership is actualized through promotion of informed decision-making by women. Starratt (1991) said, “In the sense in which a man can ever be said to be at home in the world, he is at home not through dominating, or explaining, or appreciating, but through caring and being cared for” (p. 2). Gilligan (1993) speaks to the paternalistic, hierarchical views of life as devaluing nurturing especially if it involves self-sacrifice. Servant-leaders embody the ethic of care through service and self-sacrifice. The ethic of care will be discussed first followed by a discussion of the ethic of care and servant-leadership.
Caring Defined

In Starratt’s (1991) model, the ethic of care was based upon relationships from a standpoint of absolute regard. The themes coursing through care include quality of life, cultural enrichment, loyalty, human potential, human dignity, empowerment, and environment. In Ethical Leadership (2004), Starratt challenges the reader to know who they are and to go beyond “first do no harm” and seek to “do good” as he speaks to the virtues of responsibility, authenticity, and presence. The virtue of responsibility calls on one to name the problem, avoid preventing or doing harm, identify one’s responsibility, claim one’s authenticity to the situation, and discover the proactive activities and possibilities in the situation. The virtue of authenticity is to be who one is and assume the moral imperative to one’s uniqueness. In claiming one’s authentic life, we should know who we are and, where there is a moral responsibility, let our authentic self name our responsibilities. Presence is recognizing the importance of the interconnectedness of our self with other relationships. One brings what is within to the other and brings the other into his being. Understanding comes from a sense of the other person being present in a relationship and makes one feel truly connected. Presence connects responsibility and authenticity. When one is present it is shown that an authentic relationship has been assumed with the patient. Presence takes place through verbal language and body language. It is shown through sensitivity and concentration on the person and situation.

Gilligan (1993) studied the differences between men and women as related to previously held hierarchical relationships (Kohlberg, 1984). Her work demonstrated that women thrive within an ethic of care that results in intricate webs of inter-relationships within a woman’s life. Gilligan stated: “Relationship then requires a kind of courage and emotional stamina which has long been a strength of women, insufficiently noted and valued” (p.xix). In caring, and as a servant-leader, the link is through the connection of relationships. What Gilligan set forth is that
the relationship requires empathy, the ability to listen and learn from the other but also requires allowing the other a voice. In learning about her menstrual cycle, the woman is connected to herself. She has a relationship with herself in that she understands and can be involved in self-care.

Beck (1994) identified attributes of caring as being receptive to, and accepting of, the reality of others, and once the others perspective is understood, responding to that awareness and being committed to other and the relationship. She proposed that there needs to be action on behalf of the one being cared for. Mayeroff (1971) wrote that the most important aspect of caring is a process meant to help the other grow and become self-actualized. Helping the other grow consists of a basic pattern where the person who cares recognizes the other as an extension of herself while at the same time being independent of the caregiver. The care provided the other is entwined in the caregiver’s sense of well-being and the caregiver is felt needed, not in a parasitic but, rather, in a symbiotic sense. Being devoted to the other requires affirmation over time as the caregiver guides the other’s development.

Caring allows the other to discover her own values and ideals rather than conforming to another’s domination and expectations. Such discoveries can result in better decision-making. Mayeroff’s major concepts of caring include knowing who the other is, what her powers and limitations are, and how to respond to her needs. He also advises one to look at what has been provided to the other in the caring relationship to see if it was received. If not received, then one should continue to seek other ways of teaching. A powerful attribute that Mayeroff proposes is that of patience as he warns that that the other should not be subject to the caregiver’s time frame. The patient’s time and space needs to be honored. This is accomplished by listening, being present, and tolerating ambiguity. The care provider needs to be honest in seeing the other
as she truly is and not what she is expected to be. The practitioner should trust that the other can and will grown in her own time and space. She cannot be commanded into growth.

The attributes expressed by Beck (1971) and Mayeroff (1994) fit well within women’s health because women have a long term relationship with their healthcare provider as they transition through their reproductive years. Individuals who care for women do so in amazing ways. There are women of all ages, races, educational levels, and socioeconomic groups. Common threads of the ethic of care, i.e. patience, listening, and presence need to be woven as one gives to each woman without judgment because of her life conditions.

Servant-Leadership

In his seminal essay on the servant-leader, Greenleaf (1970) proposed that some individuals have a natural desire to serve others in achieving their highest needs and they then experience a conscious desire to lead. The servant leader selects others needs as the highest priority and acts from a “base of humility, empathy, compassion, and commitment to ethical values” (Lad & Luechauer, 1998, p. 200). Although the servant as leader has traditionally been espoused for leading groups of people within organizations, Greenleaf’s premise is well-suited for the individual healthcare practitioner striving to help the individual achieve a greater degree of health, wisdom, freedom, and autonomy. He espoused the importance of listening, stating that paying attention to the speaker and searching for understanding while refraining from piecemeal value judgments was paramount in the servant-leader. Greenleaf adds to the act of listening the concept of remembering, and states the good listener is one who recognizes expressions of body language as well as words. Listening enhances the face-to-face experience, provides knowledge about attitudes, and saves time in the communication process.

Trust is also an important component in Greenleaf’s premise of servant-leadership in which he states that “individuals grow taller when they are accepted for what they are and led by
the ablest and strongest and ethically soundest people….Leaders who fully accept those who go with them are more likely to be trusted.” (p. 50). Healing, or making one whole, is a concept that is always being sought. The servant-leader who seeks to help another heal is also seeking to make herself whole. To care for others is to care for self.

Based upon Greenleaf’s original writings, Spears (2003) identified ten characteristics crucial to the development of servant-leaders: listening, empathy, healing, awareness, persuasion, conceptualization, foresight, stewardship, commitment to growth of people, and building community. These are characteristics closely aligned with the servant-leader as care provider as an attempt is made to optimize the patient’s wellness through a commitment of active listening, clarification of values, involving her in informed decision-making and whose true motive is helping the woman achieve optimal health.

Compliance is a buzz word in health care as people who question authority are sometimes termed “noncompliant”. Rather than insist on compliance, servant-leaders seek to partner in the relationship through persuasion and teaching resulting in mutual decision-making.

In their discussion of leadership, Pearce and Conger (2003), include Greenleaf’s discourses among others whose commonalities of leadership are fluid and multi-directional rather than hierarchical in nature. Kouzes and Posner (2003) agree that leaders serve constituents, are not ranked, and have a voice regardless of their standing in the social arena or employment position. The ethic of care is evident in the servant-leader model of leadership which lays a base for a relationship that facilitates the patient to “become healthier, wiser, freer, and more autonomous” (Greenleaf, 1970). The ethic of care examines quality of life, cultural enrichment, individuality, loyalty, human potential, human dignity, empowerment, and environment. While not identified as such by the authors, the latter model is consistent with
Greenleaf’s (1970) theory of servant-leader theory of leadership which is relationship-oriented and is described by Covey (2002) as a dynamic reciprocity,

Moral authority is another way to define servant-leadership because it represents a reciprocal choice between leader and follower. If the leader is principle-centered, he or she will develop moral authority. If the follower is principle-centered, he or she will follow the leader…. (pp. 5-6)

In the present study, the dilemma raised by the ethic of critique is that women are unable to be involved in healthcare decision-making because of a lack of knowledge about the menstrual cycle. It has also been proposed that the dilemma can be rectified by servant-leaders acting within the ethic of care as they commit to providing education about the menstrual cycle to their patients. The ethic of justice will present a proposed solution to right the wrong.

The Ethic of Justice

Starratt (1991) described the ethic of justice as the community governing itself in the “midst of competing claims of the common good and individual rights” (p. 195). The ethic of justice demands that the governing institution, in this case, the healthcare community, serve the common good as well as the individual. The ethic of justice examines who governs the healthcare of women, their right to access and participation in that healthcare, and the responsibilities that come with the right and the commitment to right the wrong. The challenge is that the common good for the healthcare community is financially driven often at the expense of individual rights to self-governance through education.

Starratt (1991) asked the question “How do we [the profession] govern ourselves while carrying out educating activities?” (p. 191). He stated that answers rarely come out of the ethic of critique and proposes such governance takes place out of the ethic of justice. Starratt discussed the work of Rawls (1971) who used the 17th century work of Thomas Hobbes and John
Locke when looking at the individual as the primary human relationship, independent of social relationships with a desire for comfort and a fear of harm. Within their relationships, people agree to give up some of their freedom for the protection by others. It is passion based and self-serving but felt to preserve the individual. Does this mean that women give up freedom for healthcare for their relationship with their care provider who they see as protecting them by knowing what is best?

Kohlberg (1971) put a hierarchical spin on the ethic of justice when he looked at stages of moral reasoning as individuals progress from one moral phase to the next in their ability to express ethical judgment. Kohlberg’s research involved only men and Gilligan (1993) had a different perspective on the ethics of justice. She worked with Kohlberg for a number of years and her studies of women resulted in her interpretation of the ethics of justice being as a web of relationships within one’s self and with others. She expressed what she called “the paradoxical truths of human experience – that we know ourselves as separate only insofar as we live in connection with others, and that we experience relationship only insofar as we differentiated other from self” (p. 63). The interconnectedness with others professes to result in fairness, not hurting others, and not leaving others alone. She concluded that the hierarchical vision of justice is a man’s reality while the relationship, web-viewed vision is that of women’s thoughts. This is not, she contends, wrong but rather just different ways of knowing. Each reality can have sophisticated understandings and reach solutions but in order to do so they must each be acknowledged and valued. Perhaps this is the missing link in the healthcare of women because so much of it traditionally has been within a man’s realm of thinking. The men might see their role as care provider in a hierarchical form manifested in paternalism while a woman sees her relationship with her care provider as inter-relational in need of caring attributes.
Written and unwritten assumptions exist in relationships between providers and patients. “First do no harm” is paramount. Healthcare entities have patient bills of rights (AHA, 1992) in which patients have rights to receive information on any test, procedure, or results as well as the right to refuse services they do not understand. Patient bills of rights are not systematically incorporated into private care provider practices and expressing a right to education requires a commitment of time which is challenging in the current healthcare environment.

In this dissertation, the ethic of justice was called upon to provide the resource to bridge the gap between critique and care. The resource is education—through personnel, time, funding, and the curriculum and knowledge themselves—whereby care providers and patients can synergistically govern women’s healthcare. To demonstrate the effectiveness of education, the remaining review of the literature examined the use of computer-based education in healthcare and multimedia computer-based education, and compared the effectiveness of multimedia computer-based education with printed material and individual counseling.

*Use of Computer-Based Education in Healthcare*

No computer based education studies that speak to the menstrual cycle were found in the literature, however, there were studies describing computer-based patient education modules promoting self-care and self-advocacy which, among other things, can facilitate informed decision-making and help with the demand for health services (Belda, 2004). Successful uses of computer-based education were demonstrated in a review of the literature by Lewis (1999) where computer-based education was shown to have advantages including being able to learn in private, “just in time” learning, and the ability to simulate life experiences. Studies by Castaldini, Saltmarch, Luck, and Sucher (1998), and Day, Rayman, Hall, and Davies (1997) indicated that computer-based education effectively delivered information and was user-friendly. Traditional instruction such as pamphlets was shown to be less effective than computer-based instruction in
a study by Madoff, Pristach, Smith, and Pristach (1996), who conducted a randomized experiment looking for improved knowledge retention and medication compliance with the use of computer-based education.

Huss, Salerno, and Huss (1991) conducted a randomized experiment looking for improved adherence with the use of computer-based education. Changed behaviors were found to be more effective when patients were exposed to repeated instructional opportunities. While the focus of patient education changes from study to study, a common theme of success continues to emerge as supported by Di Noia, Schinke, Pena and Schwinn (1995) who conducted an assessment of a computer-mediated intervention in order to determine if it would reduce the risk of HIV in young adolescent females. The researchers studied 205 black, white, and Hispanic girls ages 11 through 14 who participated in the study which compared the intervention consisting of a 30 minute CD computer based session entitled “Keeping It Safe” to no intervention. The purpose of the program was to increase the participant’s knowledge of HIV/AIDS, protective attitudes, and risk reduction in self-efficacy. Results showed that the intervention was significant for knowledge and risk reduction.

While increased medication compliance and risk reduction have been outcomes of computer-based patient education, healthcare decision-making has also been found to be effective with the use of computer based education. The ability to make health care decisions was increased in studies of clients with hypertension and benign prostatic hypertrophy (Shepperd, Coulter, & Farmer, 1995). One of the drawbacks of the studies reviewed was that most of the studies were not longitudinal, which could be important for retention of information (Lewis, 1999).

In an effort to facilitate shared decision making in men diagnosed with benign prostatic hyperplasia Barry, Fowler, Mulley, Henderson, and Wennberg (1995) developed a computer-
and video disc-based program entitled The Shared Decision-making Program (SDP) to assist men when faced with either having a prostatectomy or “watchful waiting” (p. 772). The program was developed to allow patients an opportunity to consider the risks and benefits of either choice. They conducted a study of how the men assessed the program. Three-hundred and seventy-three men participated in the study. The researchers were able to tailor the probabilities to a patient’s specific characteristics, and previous patients were featured who could discuss their experiences and potential outcome states. All participants viewed a didactic core program which was followed by an elective, interactive segment pertaining to their particular case. After viewing the program, the participants evaluated the program on its length, clarity, and balance. They also stated whether or not they felt the program should be viewed by patients before they made a decision on their treatment. The participants were then followed for three months to see if they had decided to have the more aggressive treatment as opposed to “watchful waiting”. Statistical significance (p < .01) was found for the variables that the amount of information was about right and most things were clear in the educational experience. While the study did not objectively support the hypothesis that decision-making would be increased, the urologists who participated in the study felt from a subjective perspective that the patients became more active participants in the decision making process.

Traditional instruction was shown to be less effective than computer-based instruction in a study by Madoff et al. (1996) who conducted a randomized experiment looking for improved knowledge retention and medication compliance with the use of computer-based education. The purpose of the program was to increase the participant’s knowledge of HIV/AIDS, protective attitudes, and risk reduction in self-efficacy. Results showed that the intervention was significant for knowledge and risk reduction.
Multimedia Computer-Based Education

Computer-based education is being used throughout our culture, i.e., teachers in the classroom, trainers in industry, and practitioners in healthcare settings as attempts are made to provide more effective ways to help learners understand pertinent information. Results of research to assess if animation enhances learning are mixed (Reiber, 1990; Sperling et al., 2003).

In an effort to see how students’ understanding of scientific explanations might be optimized, Mayer (1997) examined various methods of multimedia teaching and developed a cognitive theory of multimedia learning. Mayer explained that there are three important cognitive processes in which the learner engages when in a multimedia learning experience. In the first process of selection, the learner takes in verbal information to achieve a text base and visual information to achieve an image base. Next, the learner organizes the information received to create a verbally and visually based model of the information to be explained, and, thirdly, integration is the result of the learner making connections between the parts, events, states etc. of the verbal and visual-based models.

From his theoretical framework, Mayer (1997) conducted experiments that resulted in the development of five major principles on the best ways to use multimedia to assistant learners to understand scientific information: (a) multiple representation principle presenting an explanation in words and pictures is better than presenting in words alone, (b) contiguity principle means that rather than presenting visual and words separately, it is better to present together, (c) split attention principle refers to using narration rather than visual on-screen text, (d) individual differences principle states that the first three principles work better for low-knowledge than high-knowledge learners, and for high-spatial learners rather than for low-spatial learners, and (e) the coherence principle means it is better to use fewer than more extraneous words and pictures.
Animation has been especially useful in computer-based science materials because of the ability to show relationships within and between concepts (Sperling et al., 2003). However, Reiber (1990) stated that not only are the benefits disputed but also the learner might actually be distracted by the animations. In a study by Sperling et al. (2003), the authors looked at the effect of animation on learning in combination with text. In the study design, material was learned through animation and text. The participants were 86 students at a Mid-Atlantic university having little knowledge of the subject to be learned. The subjects were placed in one of four groups, text only, animation followed by text, text followed by animation, and the text and animation presented simultaneously. The subjects were administered a 16-item pretest followed by the instructional program. Upon completion of the treatment the subjects took a recall assessment and the posttest. In examining the learning outcomes between groups, the only significance was found in groups where text and animation were presented sequentially ($p < .008$). Otherwise, results showed that the use of visual animations neither hindered nor increased learning.

Craig et al. (2002) studied the incorporation of animation into two multimedia experiments developed within the framework of Mayer’s (1997) cognitive theory of multimedia learning. Text messages and animations created by Mayer and Moreno (1998) were replicated as closely as possible in order to match the description of the formation of lightning. One-hundred-thirty-five students were enrolled into nine groups of 15 students who had a low knowledge base about the subject matter. All of the subjects in the first experiment listened to narration describing lightning formation. Three groups of student participated in three screenings. Three conditions existed in each of the three screenings: Animation with no animated person (agent) on the screen, animation with an agent present on the screen, and agent on the screen using gestures toward the animation. The lack of significance in the results showed that the presence of an on-
screen text does not result in a split-attention effect which is consistent with Mayer, Heiser, & Lonn (2001).

The second experiment looked for redundancy effect whereby information not necessary can reduce the effect of learning. Once again, Mayer et al. (2001) was cited where students who received narration with animation achieved better outcomes on both retention and transfer tasks than students also received printed text. In the second experiment, 71 students were placed in three groups the first using narration along with animation, the second group given printed text with the animation, and the third group both narration and printed text to go along with the animation. The results of this study showed a significant effect in the retention of data in the narration group when compared with the printed only group ($p < .01$). There was no significance between the narration plus printed material and the other two groups. In a matching test, there was significance showing that the students in the narration group performed better than the group with the printed condition ($p < .05$) as well as minimally performing better than those with the printed condition ($p < .05$). Thus, the redundancy effect, as described by Mayer et al. (2001), of printed text significantly interfered with performance. In looking at the effects of presenting print as well as narration together, the study showed a significant effect ($p < .01$) in that students who participated in the narration condition performed better than those who had print and narration plus print conditions.

**Multimedia Computer-Based Education and Other Types of Instruction**

**Print.** In a study by Friedl et al. (2005), a comparison was made between teaching about aortic valve replacement by either a multimedia module or printed material. Sixty-nine students were randomly assigned to use the instructional multimedia course and 57 to use the instructional printed material with both groups completing a pretest and a posttest after the intervention. They subsequently participated in an application activity that evaluated their ability
to perform 28 standardized tasks and questions. Although the authors recognized that the results showed there was no difference between the two groups, the students in the multimedia group required less study time and from personal observation the students understood the techniques better and were faster than the print-only group.

In an effort to compare the effectiveness between a printed leaflet and touch-screen computer in order to assess which format they preferred, Bulmer (2001) studied the results of 40 women who took a pretest on knowledge of lower urinary tract symptoms followed by the treatment using either a pamphlet or a computer module and, finally, administered a posttest. The women significantly increased their knowledge of the material with both methods of treatment and, although not significant, there was a trend for preference for the computer activity.

Self-medication errors are common in the elderly. In an effort to teach the elderly about potential drug interactions, Neafsey, Stricklery, Shellman, and Cartier (2002), developed an interactive computer program (Personal Education Program - PEP). The value of the program was studied comparing the program that was used along with an information book, the information book by itself, and a control group. The participants used the educational tools three times over a two week time period. Results showed the PEP was evaluated highly by the participants while also reporting fewer self-medication problems.

An investigation by Street, Voigt, Geyer, Manning, and Swanson (2006) examined factors which could affect the involvement of patients with physician consultations in order to determine local treatment for breast cancer. They also studied the effect of preconsultation educational methods in increasing participation in the physician/patient interaction.

The patients took a pretest/posttest with intervening preconsultation intervention after which they met with the cancer specialists. Following their meetings they self-reported on their degree of involvement and control regarding decision-making. Decision-making was evaluated
by the use of audio recording which had indicators for involvement in decision making
consisting of asking questions, stating concerns, and giving their opinion. The statements made
by physicians were recorded which supported patient involvement and were interpreted related
to encouraging patient participation. Results showed the method of education was not a
determining factor in involvement with the physicians, however, the participants learned more
from the multimedia education about breast cancer treatment than the brochure.

*Individual counseling.* Miller, Kimberly, Case, & Wofford (2005) compared an
educational format of a multimedia computer program with individual nurse counseling to
determine if patients could learn effectively about occult blood testing leading to an increase in
individuals being screened for occult blood. There were 204 subjects who were randomized into
two educational sessions. One group participated in a counseling session and another in a
computer session teaching the importance of occult blood screening. The goal was to have the
patient complete the screening at home and return their card within a month. While a significant
number of women versus men returned their card (\(p < .006\)) and patients who had experienced a
prior experience with colon rectal screening were more likely to return their card (\(p < .006\)).
However, results showed that the multimedia computer program was as effective as the
individual counseling but not significantly better. The researchers reasoned that the computer
program was valuable because it would save on staff time and could be accessible in any office
as it answered the physicians reported challenge of inadequate time with patients.

Another outcome was the assessment that, although there were participants with little
computer experience, the majority had no problem working the mouse and navigating the screen.
This was consistent with a review of the literature by Lewis (2003) who examined MEDLINE
and CINAHL about computer-based education. Her results found that computer-based education
is an effective way to teach patients. Furthermore, she found that socioeconomic disparities had no reported impact on the ability of participants to use the technology in a meaningful way.

While not all the studies cited did not result in a statistically significant difference in knowledge from pretest to posttest between the treatment methods, computer-based education was not shown to be any less effective. The strengths of the computer-based education appear to have been in patients being receptive to the method of education and the time saved in administration.

Summary

The review of the literature was framed within Starratt’s educational practice framework of the ethic of critique, care, and justice. The review of the literature critiqued the marketization and medicalization of women’s healthcare by looking at giving women antidepressants for PMDD, a condition that has not been proven to exist, the change in insurance reimbursement for hormonal contraception when the insurance companies were paying for Viagra but not for contraception, and the dispersing of hormonal contraception without long term studies of safety.

Challenges women face in their healthcare decision-making make it imperative that care providers function as servant-leaders within an ethic of care in promoting shared governance in healthcare decision-making with these women. The web of relationships within an ethic of care was discussed and included the embodiment of servant-leadership in facilitating the patient to be “wiser, healthier, freer, and more autonomous” (Greenleaf, 2003). Such a relationship requires the patient to be informed. However, the literature revealed that women do not have an understanding of their menstrual cycle and that menstrual educational materials have historically been inaccurate, biased, and promoted for product loyalty. The challenges faced related to healthcare decision-making, time constraints in patient education, the lack of knowledge of the
menstrual cycle, and the dearth of quality educational materials on the menstrual cycle spoke to the need for avenues to promote menstrual cycle education.

The ethic of justice spoke to the right of women to be informed and their responsibility to act upon the information they had in their healthcare decision-making. The avenue of justice was explored through the use of computer-based education and the resources allocated to it. Computer-based education was found to be effective in the literature with mixed results when incorporating multimedia computer-based education. However, in spite of the fact that there is not a significant difference between methods of instruction be it print or individual counseling, computer based education has been received positively by participants and has been shown to be effective among patients from all socioeconomic levels. What was missing from the literature was any information on computer-based education on the menstrual cycle, whether multimedia or not, or the value that women placed on menstrual cycle education in any format. The lack of studies on computer-based educational methods in the literature supported the current study to examine the effect of computer-based, multimedia education on knowledge of the menstrual cycle in order to promote women becoming informed decision-makers in their healthcare.
CHAPTER III. METHODOLOGY

Introduction

Chapter III describes the participants, research design, description of the treatments, instrumentation of the study, and procedures. The chapter concludes with a description of data collection and data analyses.

Participants

The researcher received permission to attend undergraduate classes in the psychology, education, and family and consumer science colleges at a midwestern university to invite women 18-years-of-age or over to participate in the study. The researcher explained to the students that the study focused on women’s health education. The students were aware they needed to be available for a 1 to 1 ¼ hour session. The goal was to have a convenience sample of 90 participants, 30 for each independent variable. There was a convenience, non-probability sampling of volunteers. While one hundred and forty-three students in the various classes volunteered to participate, only 72 completed the study.

Research Design

A randomized pretest/posttest comparison group experimental design using three contrasting treatment groups was implemented. The independent variable represents the type of treatment: the Computer-Based Multimedia Educational Module (C-bmem), the Information Module (IM), and the PowerPoint module (PP) (Appendix A). The dependent variable, knowledge of the menstrual cycle, was measured at pretest and posttest. Therefore, knowledge was measured three ways: pretreatment knowledge, post-treatment knowledge, and change in knowledge (difference between pretest and posttest knowledge).
Computer-Based Multimedia Educational Module (C-bmem)

The treatment for this group was the C-bmem on the menstrual cycle entitled “A Woman’s World: Discovering the Dynamic Menstrual Cycle.” The C-bmem was a revision of an educational module developed by the author of the present study in Moon and Baptista (2002) as a project for a teaching fellowship at the university where both authors teach. The module addressed what had been identified as lacking in previous educational materials, i.e. real pictures of anatomy such as the ovaries, uterus, fallopian tubes, etc., appropriate terminology, and the interplay of hormones being depicted throughout the module by the use of animation and real time-line graphics. The C-bmem, included both text on the screen and also narration of the text by a professional voice-over artist. In introducing the module, a picture of a young girl morphed into a middle-aged woman and an older woman. At the same time a narrated overview of the menstrual cycle throughout a woman’s lifespan was presented. Acknowledging individual variations, basic information was presented including the parameters of a “normal” menstrual cycle namely frequency, regularity, length, and average blood loss.

A computerized graphic highlighted the location of the hypothalamus and pituitary gland in the brain and included terminology of hormones originating at those sites and animation of the flow of hormones from the originating site through the bloodstream leading to the ovary. Female reproductive anatomical sites were depicted in both a photo of real sites and a computerized graphic and included the ovaries, fallopian tubes, uterus (including the endometrial lining and cervix), and vagina. A graphic depiction of the ovary showed the development of an ovum during the menstrual cycle. Hypothalamic, ovarian, and endometrial hormonal functions in the menstrual cycle were presented and included timelines for the release of the hormones. Two slides showed events for fertilization and non-fertilization. Through animation, the ovum was shown developing in the ovary relative to a timeline of hormonal release. After ovulation, it was
shown traveling through the fallopian tube into the uterus to be discarded with the menses if fertilization had not occurred. In the slide showing fertilized animation, sperm penetrated the ovum and cell division took place which resulted in implantation of the embryo in the endometrial lining of the uterus.

Text, graphics, photos, and timelines on the C-bmem were the same as the IM and PP except for voice-over narration, animation and two additional slides. An addition to one of the introductory pages depicted a silhouette of a woman with animation showing the cyclic nature of the menstrual system between the brain and reproductive organs. The second addition showed a picture of changes to the endometrial lining over the course of the four endometrial phases of the cycle. Throughout the text, “Did You Know” sections were presented where participants were given further content about how the information in the section might impact their fertilization, pregnancy, or sense of wellbeing. Examples included physical changes a woman can feel or observe during ovulation, how hormonal birth control prevents pregnancy and the effect of anorexia on the menstrual cycle.

*Information Module (IM)*

A 16-page document, which had two slides to a page, entitled, “A Woman’s World: Discovering the Dynamic Menstrual Cycle” was developed using the same script, photos, figures, and graphics that were presented in the PP and C-bmem modules without the animation and the previously mentioned additional pieces shown only in the C-bmem.

*PowerPoint Module (PP)*

The PowerPoint module was the same as the IM with the only difference being that it was presented on 32 slides on a CD to be read off the computer. The longer length of both the IM and PP slides in comparison with the C-bmem were due to the changes that would have been animated but were shown in each stage of still effect.
Instrumentation

Participant Background Information (PBI)

The Patient Background Information (PBI) form (Appendix B) was administered which asked for demographic information including age and year in college as well as information on how the participant learned about the menstrual cycle and her life experiences with her menstrual cycle.

The participant’s grade point average was requested to make sure all three groups were equivalent in their educational level. Two questions were asked of the participants at the end of the session after completion of the posttest. Because there was a time period of about seven days between the pretest and the posttest, it was decided to add a question asking the participant if she had read anything on the menstrual cycle in the intervening days between the time she took the pretest and posttest. The last question involved asking the participant if the educational experience would be of value to her in the future.

Menstrual Cycle Knowledge Instrument (MCKI)

The Menstrual Cycle Knowledge Instrument (MCKI) (Appendix C), to evaluate the level of knowledge about the menstrual cycle, was developed by the researcher. The information obtained by the researcher came from nursing textbooks (Ladewig, London, Moberly, & Olds, 1998; Pillitteri, 2003). In an effort to assess whether the information in the module would be pertinent to women in general, the researcher performed a “GOOGLE” search on the Internet. When the words “menstrual cycle” were entered thousands of sites appeared. The researcher selected the first nine educational sites:

Http://www.womenshealthmatters.ca/centres/sex/femalebody/menstrualcycle.html
http://www.28-days.
http://com/Introduction.htm
Each site was reviewed by the researcher to evaluate whether the information in the C-bmem was consistent with information from the sites. It was with confidence that the information in the module was deemed appropriate in terms of content.

The MCKI was different only in that the pretest had distracter questions so the students might not realize the menstrual cycle was the sole focus of the educational interventions. The legitimate questions focused on menstrual cycle information such as anatomy, physiology, hormones, fluctuations in hormones and practical application of the information gained. Questions pertaining to female reproductive anatomy, hormonal interplay within the anatomy, fertilization and non-fertilization were included. The distracter questions covered other women’s health issues such as the breast cancer gene and a new vaccine for the human papilloma virus. The distracter questions were removed from the posttest. The participants took the pretest at the same time that they consented to participate in the study. The posttest was taken at the research session approximately a week later upon completion of the intervention. The format included identification of anatomy of the reproductive organs on a picture, matching of hormones with originating sites, and the use of four-option, multiple choice questions regarding the menstrual cycle and application to a woman’s reproductive life. The items were scored as “right” or “wrong” using PAR SCORE, a computer-based grading system from which the item analysis
was derived. The highest possible score was 32. The study looked at improvement in knowledge as opposed to mastery of content.

Content validation about the information on the MCKI was completed by seven midwives having knowledge of the menstrual cycle. The midwives received a copy of the MCKI and were asked to check each item for content accuracy, readability, level of difficulty, and pertinence to patient education. Based on the panel member’s verbal responses, the researcher rewrote the items and resubmitted the revised draft to the midwives. Further discussion took place and a third draft was written. A midwife who was not involved in the original drafts then reviewed the final version and gave suggestions into the difficulty of some of the questions related to reading level by making a few suggestions in the terminology. A final draft was prepared. The readability of the instrument was computed at grade 12 level.

The items within the pretest were relatively homogenous from the standpoint of content sampling. The method for estimating reliability was internal consistency. The pretest was used to rate reliability of the instrument which was estimated by computing a $KR_{20}$ internal consistency coefficient. The $KR_{20}$ was .24 ($M = 15.08; SD = 2.77$) indicating low internal consistency. Reasons for the low $KR_{20}$ were the low variation and distracter questions, which were not part of the content, thereby contributing to content sampling error. The sample demonstrated a consistent lack of knowledge regarding the menstrual cycle with relatively small spread in the scores. Internal consistency depends on variability and can be lowered by virtue of the small spread. The item analysis of the posttest showed a $KR_{20}$ estimate of internal consistency of .67 ($M = 22.79; SD = 3.62$) indicating the posttest has a higher level of internal consistency than the pretest.
Procedures

The researcher submitted a Human Subjects Review Board application to the student’s institutional review board for approval. After approval was given, the researcher, who is a faculty member at another university, notified the Institutional Review Board at the institution where she worked of the approval by written letter as a part of a consortium agreement between the two universities.

Classrooms in the College of Education and Human Development were reserved for six sessions, two for each intervention. Additionally, laptop computers were reserved from the computer lab for students in PowerPoint group and laptops and earphones were reserved for the students in C-bmem group.

The researcher gained permission from the faculty of record to attend classrooms to present the research project to the female students over the age of 18 and invite them to participate in an educational session on women’s health education. They were told the session would be held in an assigned classroom and would last approximately 1 to 1¼ hours followed by two $50 drawings at the end of each session. Students were assured that if they chose not to participate there would be no effect on their grade in the class in which the researcher was presenting the study. Students who agreed to participate received a numbered enrollment packet.

Each packet had been randomly assigned using a table of random numbers. When preparing the participant envelopes, an identifying number was placed on the front and a corresponding number was placed all forms to be used by the participant. Each student placed an identification number, consisting of date of birth and the last four numbers of her social security number on each form, i.e. 022919443312. There were 180 packets prepared with the hope that 180 people would participate. The packet included an invitation letter about the study (Appendix D), a consent form (Appendix E), and a laminated bookmark with the assigned day, date, time,
building, and room number on it. The packet also included an index card requesting the student’s email address for a reminder to be sent out to the student of the date, time, and place of her session. Upon completion of the consent form and the reminder card, the pretest was administered. The PBI was not administered at the time of enrollment into the study in order to avoid the student knowing that the study was about the menstrual cycle. All materials were placed back in the envelope except for the consent explanation and the bookmark which were kept by the participant, and returned to the researcher. Reminder emails were sent out immediately after the student enrolled and within a day of the session.

Research assistants, consisting of two senior nursing students and a professor assisted with each treatment session. Each treatment, the C-bmem, IM, and PP had two sessions for a total of six sessions on two evenings. The research assistants were instructed on the procedures to be followed during the sessions. Tasks assigned included handing out packets determined by the participant identification number (birth date and last four numbers of the social security number). Included in the packet were the PBI, the posttest, and the Scantron form. The assistant registered the participant for the drawing, had her fill out the PBI, and handed out the intervention tool. The participants began the treatment at the same time and the assistant kept track of the 30-minute timeline after which time the posttest was administered. At the conclusion of the session, the assistants instructed the participants to put all paperwork in the envelopes, collected all envelopes, and conducted the $50 drawings. Because two sessions were going on at the same time, the researcher visited between areas to make sure the sessions were progressing as expected. The assistants used a cell phone to contact the researcher if she was needed.

After the initial class visits, 143 women were enrolled in the study and took the pretest. However, only 74 students presented for the treatment and posttest session. When asked on the background form if the student had read information on the menstrual cycle between the pretest
and posttest, two had, so their outcomes were excluded from the data analysis. Therefore, 72 subjects completed the study.

Confidentiality of all participants was assured by the researcher throughout the study and will be for publication of study results. The student name appeared only on the consent form and email address appeared only on the index card. The index card was shredded after the emails reminding the students of their educational session were sent out. All data were stored in a locked file cabinet in the researcher’s office. Results are presented only in summary form.

Data Analysis

The dependent variable was knowledge of the menstrual cycle which was measured by the pretest/posttest. Means and standard deviations were computed on the dependent variable at pretest and posttest by treatment (C-bmem, IM, and PP) conditions. Change in knowledge from pretest to posttest was also calculated. Since hypothesis 1 posited a difference in change from pretest to posttest among the three treatment interventions, the null hypothesis of no difference in the mean change among the three treatment groups was tested using an F test from the analysis of variance (ANOVA) of change scores. An analysis of covariance (ANCOVA), using the pretest as a covariate, was also conducted to test the null hypothesis of no difference in the adjusted posttest means. Since hypothesis 2 speculated that there is a difference between the pretest and posttest means for each treatment group, the null hypothesis of no difference between pretest and posttest means was tested using a related samples $t$-test. The criterion for statistical significance was .05 for each null hypothesis. The 95% confidence interval was constructed for the pretest and posttest means for each treatment group. Table 1 shows the hypotheses, the independent variable, the dependent variables, the covariate, and the data analysis techniques used.
Table 1

Hypotheses, IV, DV, Covariate, and the Data Analysis Techniques Used

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Independent Variable</th>
<th>Dependent Variable</th>
<th>Covariate</th>
<th>Data Analysis Technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. C-bmem vs. IM &amp; PP</td>
<td>Treatment Type</td>
<td>Change in Knowledge</td>
<td>ANOVA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Treatment Type</td>
<td>Posttest Knowledge</td>
<td>Pretest</td>
<td>ANCOVA</td>
</tr>
<tr>
<td>2. Pretest and posttest mean difference</td>
<td>Pretest Knowledge</td>
<td>Posttest Knowledge</td>
<td>t-test of related samples for each treatment</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER IV. RESULTS

Introduction

This chapter presents the statistical results of the study based on the data collection from the three treatment groups. First, the participant demographics will be presented, which will be followed by the descriptive statistics. Next, the statistical tests of the null hypotheses will be presented.

The purpose of this study was to compare the effectiveness of the C-bmem on knowledge of the menstrual cycle with the IM and the PP.

Demographics and Descriptive Results

Seventy-two participants completed the study. Information gathered from the Patient Information Background form showed the average age to be 20-years-old. The youngest age identified was 18, and one participant was 29. When responding to a request to indicate the top three sources that were most meaningful in learning about the menstrual cycle, 41 of 62 women who answered placed their mothers in the top three rankings (See Figures 1, 2, and 3) followed by high school \( n = 33 \) and elementary/junior high school \( n = 32 \). When asked about their age when they had their first menses, 19 women started before age 13, 49 started between 13-15, and 4 were older than 16. The frequency of menses ranged from fewer than every 18 days \( n = 3 \) to more than every 35 days \( n = 4 \) with 64 experiencing their menses within the normal range of 18-35 days. When asked if their menses was regular or irregular, 58 (81%) stated theirs was regular and 12 (17%) stated theirs was not regular. When women were asked to rate their flow, 13 (18%) rated theirs as “mild,” 45 (63%) rated theirs as “moderate,” while 10 (14%) rated theirs as “heavy.” Symptoms associated with menses that interfered with daily activities were identified as cramping \( n = 21, 29\% \), food cravings \( n = 6, 8\% \), headaches \( n = 6, 8\% \), and
mood swings (n = 5, 7%). Dizziness and diarrhea were both identified by two women (3%) as interfering with their daily activities.

There were 32 questions on the pretest and posttest. Results showed that women knew very little about the menstrual cycle on the pretest. Correct answers ranged from 9 to 22 with an average of 15 or 47%. On the posttest, significant improvement occurred with the range of correct responses being 12 and 31 with an average score of 23 or 72%.

*Figure 1.* Frequency of Choices Ranked First as for Source of Learning about the Menstrual Cycle.
Figure 2. Frequency of Choices Ranked Second as for Source of Learning about the Menstrual Cycle.
Thirty-eight women (53%) were currently using contraception. Fifteen (21%) denied ever having used contraception while 18 (25%) stated they had done so in the past. While the 38 women who stated they used contraception to prevent pregnancy, 29 (40%) also stated they used contraception to alleviate menstrual discomforts, 11 (15%) did so to prevent sexually transmitted diseases, and three (4%) to control the number of periods a year.

Grade point averages ranged from one (1%) participant having under a 1.99 GPA; 8 (11%) of 2.0-2.49; 13 (18%) of 2.50-2.99; 23 (32%) 3.0-3.49; and 27 (38%) of 3.50-4.0. When asked after the posttest was administered if the educational experience would be of value to the
participant in the future, 41 (60%) stated “definitely,” 25 (35%) stated “probably,” and 4 (5%) stated “probably not” (See Figure 4) with two writing “lesbian” at the side.

**Figure 4.** Frequency of Value of the Educational Session for Participant in the Future.

![Bar chart showing frequency of responses](chart.png)

**Inferential Statistics**

_Hypothesis 1._ There will be significant group differences in change in knowledge about the menstrual cycle in women who participate in the C-bmem relative to the IM and PP.

Means, standard deviations, and the 95% CIs for the change scores are summarized by treatment group in Table 2.
Table 2

*Group Differences in Change of Knowledge about the Menstrual Cycle*

<table>
<thead>
<tr>
<th>Treatment</th>
<th>$n$</th>
<th>$M$</th>
<th>$SD$</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-bmem</td>
<td>23</td>
<td>8.05</td>
<td>3.40</td>
<td>6.54</td>
<td>9.55</td>
</tr>
<tr>
<td>IM</td>
<td>25</td>
<td>8.29</td>
<td>4.12</td>
<td>6.55</td>
<td>10.03</td>
</tr>
<tr>
<td>PP</td>
<td>24</td>
<td>7.04</td>
<td>3.60</td>
<td>5.49</td>
<td>8.60</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>7.80</td>
<td>3.72</td>
<td>6.90</td>
<td>8.69</td>
</tr>
</tbody>
</table>

The null hypothesis was not rejected. Results indicate no significant difference in the change in knowledge about the menstrual cycle between the C-bmem, IM, and PP [$F(2, 66) = .729, p = .486$]. The results of the analysis of variance are found in Table 3.

Table 3

*Analysis of Variance of the Change Scores*

<table>
<thead>
<tr>
<th></th>
<th>$SS$</th>
<th>$df$</th>
<th>$MS$</th>
<th>$F$</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>20.29</td>
<td>2</td>
<td>10.15</td>
<td>.73</td>
<td>.49</td>
</tr>
<tr>
<td>Within Groups</td>
<td>918.87</td>
<td>66</td>
<td>13.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>939.16</td>
<td>68</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To examine the original hypothesis further, the researcher conducted an analysis of covariance to determine group difference in posttest scores while controlling for pretest differences. The covariate pretest was significantly related to the posttest [$F(1,66) = 6.319, p = .014$]. The null hypothesis of no difference in the adjusted posttest means, however, was not
rejected. Adjusted group posttest means were not significantly different across the treatment groups \(F(2,66) = 1.938, p = .274\) (See Table 4).

Table 4

*Original and Adjusted Means of the Knowledge about the Menstrual Cycle Posttest by Treatment Group*

<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>Original</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>M</td>
</tr>
<tr>
<td>C-bmem</td>
<td>23</td>
<td>22.74</td>
</tr>
<tr>
<td>IM</td>
<td>25</td>
<td>23.68</td>
</tr>
<tr>
<td>PP</td>
<td>24</td>
<td>22.50</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>22.99</td>
</tr>
</tbody>
</table>

_Hypothesis 2._ There will be a significant difference in the knowledge gained on the menstrual cycle between pretest and posttest for women in each treatment group.

The null hypothesis of no difference between the pretest and posttest means was rejected for each treatment group. All three groups showed significant increases from pretest to posttest in knowledge. Table 5 presents pretest and posttest means for each group as well as \(t\)-test results.
Table 5

t-Tests and 95% CIs for the Change in Knowledge about the Menstrual Cycle From Pretest to Posttest for Each Treatment Group

<table>
<thead>
<tr>
<th>Grp</th>
<th>n</th>
<th>Pretest</th>
<th>Posttest</th>
<th>t</th>
<th>p</th>
<th>95% CI of the Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>Lower</td>
</tr>
<tr>
<td>C-b</td>
<td>23</td>
<td>14.87</td>
<td>2.79</td>
<td>22.73</td>
<td>3.62</td>
<td>-11.00</td>
</tr>
<tr>
<td>IM</td>
<td>25</td>
<td>15.40</td>
<td>2.42</td>
<td>23.68</td>
<td>3.18</td>
<td>-10.26</td>
</tr>
<tr>
<td>PP</td>
<td>24</td>
<td>15.38</td>
<td>3.24</td>
<td>22.50</td>
<td>3.59</td>
<td>-9.85</td>
</tr>
</tbody>
</table>

Summary

The results of the study did not support hypothesis 1 that the three interventions would produce differences in change in knowledge about the menstrual cycle. However, the C-bmem was not any less effective than the other two. The results supported hypothesis 2 in that statistical significance was shown in the increase in knowledge in each of the three interventions. All but four of the participants who responded indicated that they would probably or definitely use the knowledge gained in the future.
CHAPTER V. DISCUSSION AND CONCLUSIONS

Introduction

Chapter V will begin with a brief review of the problem, purpose and methods of the study, hypotheses, and results. The chapter will conclude with implications for practice, and suggestions for further research.

Framed by Starratt’s (1991) multidimensional construct of the ethics of critique, justice, and care, the goal of this research has been to evaluate the effectiveness of the C-bmem on menstrual cycle knowledge compared to the IM and the PP. A second desired outcome was to promote education of the menstrual cycle through the use of the C-bmem in the healthcare delivery setting in order for women to participate more fully in decision-making. The researcher has not found any research about the menstrual cycle intended to promote menstrual cycle education within the healthcare practice office. Nor was any literature found that placed educating women about their menstrual cycle within an ethical framework.

Meanwhile, previous studies have found that women lack knowledge of the menstrual cycle and educational materials evaluated over a 50-year period of time have been inaccurate, incomplete, and product driven. No studies were found which provided educational interventions, assessed knowledge gained from those interventions, or identified the value women placed on any increase in knowledge. The current study addressed all three issues.

Background of the Study

Knowledge of the anatomy and physiology of the menstrual cycle is fundamental to a woman’s participation in healthcare decision-making. However, many women present to their care provider’s office without such knowledge which can place the care provider in a paternalistic role of making decisions without involving the woman. A lack of informed decision-making is especially important in today’s society where there is a proliferation of
pharmaceuticals, some of which are dispensed and found later to have adverse effects. If a woman understood the risks and benefits of her decisions, she might choose to avoid taking anything rather than place a potentially unsafe medication in her body. Examples of hormones that might be problematic include the menstrual suppression hormones that have not had longitudinal studies, and hormone replacement therapy which has been implicated in breast cancer and cardiac disease with long term use. At any rate, the woman bears the ultimate burden of a poor outcome.

The purpose of the pretest/posttest experimental design for hypothesis 1 was to examine the effect of the C-bmem on the level of knowledge of the menstrual cycle when compared to the IM and the PP. A quasi-experimental design was used for hypothesis 2 to compare the increase in knowledge between the pretest and posttest within each treatment. The study was intended to test a patient education tool on the menstrual cycle that would engage women in healthcare decision-making. The dependent variable was operationally defined as scores from a test of knowledge about the menstrual cycle as measured by the pretest/posttest. Means and standard deviations were computed on the dependent variable at pretest and posttest by C-Bmem, IM, and PP conditions.

To conduct the study, the researcher attended undergraduate classes in education, psychology, and family and consumer sciences at a midwestern university to invite female students 18-years or older to join the study. One-hundred-and-forty-three students registered and participated in the first session. The students received information about the study and were randomly assigned to a second session occurring a week later. Seventy-two students presented for the second session. Reasons for the low turnout might have been that the first session took place at the time of class or right after class which was convenient. The students might not have
been motivated to go out in the evening a week later to attend the second session. Or, perhaps the students were not interested in learning about women’s health.

At the initial session, the convenience sample of students were randomly assigned to the three treatment groups and participated in a pretest. At the second session the students completed the PBI and participated in an intervention of either the C-bmem, the IM, or the PP. The posttest followed the interventions.

The data analysis technique used to test hypothesis one was the ANOVA for change in knowledge and ANCOVA for posttest knowledge. The data analysis technique used to test hypothesis two was the t-test of related samples for each group.

The hypotheses tested, and results obtained, were:

1. There will be significant group differences in change in knowledge about the menstrual cycle in women who participate in the C-bmem relative to the IM and PP. Results of the study showed the C-bmem did not significantly affect the change in knowledge about the menstrual cycle when compared to the IM or the PP.

2. There will be a significant difference in the knowledge gained on the menstrual cycle between pretest and posttest for women in each treatment group. Results showed support for hypothesis 2 in that women in all three treatment groups were able to gain a significant amount of knowledge as evidenced by the change from pretest to posttest (\(p < .001\)).

Discussion of Results

One expected major result from this study was that women in the sample had minimal knowledge of the menstrual cycle as evidenced by a less than 50% mean on the pretest. This finding supported the research of over 17-years showing a continuing lack of knowledge women have of their cycle (Koff et al., 1990; Koff et al., 1995; and Moore, 1995; Sievert et al., 2005). On the PBI, women ranked their top three sources of education from eleven choices. The top
three rankings were mothers (41), high school (33), and elementary school (32). Health care providers ranked fifth (19). In spite of how they ranked their sources of information, the findings on the pretest clearly demonstrated that women overall were lacking in the knowledge of the menstrual cycle. Regardless of the information delivery model, there is clearly evidence of the need for menstrual cycle education.

The study supported previously reported research by Bulmer, et al. (2001), and Friedl et al. (2005), in that, while the results did not show the C-bmem to be significantly more effective than the other two treatment groups, it was not any less effective when compared with printed material. Also, while the current study did not seek to determine which type of education might be more attractive to the participant, previous research shows that participants tend to favor computer-based education (Bulmer, et al., 2001; Neafsey, Stricklery, Shellman, and Cartier, 2002). This researcher feels that, in the women’s health practice setting, a multimedia module would be preferable because of the cumbersome nature of the printed material (16 pages) used for this study as well as the 32 slides on the PP versus 8 slides with the C-bmem, time saved, animation developed to show the cyclic nature of the menstrual cycle, narration to instruct on pronunciation of anatomy and physiology terms, and the overall attractiveness of the module.

Two additional major findings emerged from the study. The first was that, no matter which intervention was used, a significant amount of knowledge about the menstrual cycle was obtained by the participants as evidenced on the posttest ($p < .001$). The second major finding was that 66 of 70 respondents stated the knowledge gained would be of value to them in the future. These findings clearly indicate that women are capable of learning about the menstrual cycle and plan to carry the education with them in the future.

A major unintended outcome was found in the study. The results of the pretest showed that the initial knowledge held by women with a GPA of 3.0 or greater was not significantly
higher than women whose GPA was 2.99 or less on the pretest. However, on the posttest, women with GPAs of 3.0 scored significantly higher ($p < .006$) than women with GPAs of 2.99 or less. Perhaps the students with GPAs of 3.0 and higher were more motivated to do well and/or had better memory skills.

The significance of this research, from a practice perspective, was to offer the healthcare provider the C-bmem to be used for patient education. Furthermore, the development of the C-bmem attempted to remedy the critique of fifty-years of printed educational material continuing to be problematic in content accuracy and nonbiased information (Erchull et al., 2002; Havens et al., 1989; Koff et al., 1995; and Whisnant, et al., 1975).

The results in the discussion that follows will be interpreted using the framework of Starratt’s (1991) multidimensional model of the ethics of critique, care, and justice.

The Ethic of Critique

A major premise in this study supports the critique of the literature that women throughout the years continue to lack knowledge about the menstrual cycle. As well, the research reviewed in this study found educational materials on the menstrual cycle over the past fifty-years to often be incomplete, inaccurate, or product driven.

In this study, the author critiqued the flawed structural arrangement of healthcare related to disparities in women’s health. It was important to do so because women need to look at how their healthcare has been manipulated over the years and frame it with implications for today. Through empowering themselves by obtaining knowledge of the menstrual cycle, they can partner in their healthcare decision-making. While this examination looked at American healthcare and what encompassed it from a larger perspective, it is important to note that that the study was concerned with reaching the one, the individual woman seeking to find her own, individual power through knowledge.
One example of disparity within women’s health was the historical nonpayment of oral contraception by insurance companies. However, when Viagra came on the market for male erectile dysfunction, it was reimbursed by insurance which caused women’s health advocates to challenge the reimbursement structure. Subsequently, many states legislated that insurers could not deny payment for oral contraception.

Another example was the unsubstantiated diagnosis of Premenstrual Dysphoric Dysfunction (PMDD). The drug, Serafem, is currently on the market for treatment of a mental illness that has been placed in the DMS code by the American Psychiatric Association and approved by the FDA without evidence-based research to prove that it is an actual disease (Caplan, 2004). The premise set forth by Caplan is that Prozac was in jeopardy of losing its patent, so its parent company Eli Lilly placed it under another name and set of symptoms in order to maintain the patent. So, women are being labeled with a mental illness that is not research-based and treated with a medication that is not benign in nature. Other contemporary issues include the provision of hormones, such as Lybrel, to suppress menstruation without longitudinal studies of their safety and hormone replacement therapy which has been proven to be harmful with long-term use.

In our society, the menstrual cycle is acknowledged mostly in light of the monthly menses which is meant to be shrouded in secrecy lest the “uncleanliness” of the event offends anyone. On many occasions when women experience discomforts with the menstrual cycle, it is all too often diagnosed as an emotional aberration and antianxiety or antidepressant drugs are given to the woman as opposed to recognizing and validating the existence of the hormonal changes in the cycle which might have physical manifestations and nonpharmaceutical relief options without an understanding of what “normalcy” involves.
Women who are in their reproductive health years now were born, for the most part, in the 1980s and mid-1990s when their mothers were in their childbearing years. Many of their mothers might be in the perimenopausal phase of their reproductive lives at this time. With the introduction of the birth control pill in the 1960s and legalization of abortion with the Roe vs. Wade Supreme Court decision in 1973, neither generation has ever known what it was like to be marginalized and not have a voice in their control over pregnancy. However, since those historic times, women have experienced silencing about discussing their menstrual cycle (Kissling, 1996). The current study demonstrated that women lacked knowledge of the menstrual cycle, were able to obtain a significant amount of knowledge in a short period of time, and valued the knowledge received. This researcher concludes that a key proponent to finding one’s voice is knowledge.

Our current health care delivery system is driven by cost containment meaning reimbursement is often a function of number of patients seen during the day. The timing of appointments makes it difficult to provide education with some clinics being double-booked every 15 minutes (J. Thomas, R. Beringer, J. Stephenson, personal communication, October 2, 2007). While this research was meant to aid healthcare practitioners, the results show that education on the menstrual cycle is not perceived as provided in the practitioner’s office. It is understandable given the constraints within the office setting. The C-bmem would be of great assistance in filling the void as it would be available at the point of contact for healthcare decision-making. Also, it could certainly be powerful for women to identify care providers as being a leader in education on the menstrual cycle especially in light of the fact that they are the ones prescribing medications with potential adverse outcomes.

The ethic of critique challenges educational leaders to examine the historical context surrounding the creation of the culture of silence and domination of women related to the
menstrual cycle. The purpose of this examination should be to construct an environment in
which education takes place ethically (Starratt, 1991). Likewise, in the healthcare environment,
education should be ethically driven. Starratt states schools were established to serve a high
moral purpose, to not only do “no harm” but to further “do good” as should healthcare
practitioners. Hierarchical, paternalistic care providers coupled with time constraints and
bureaucratic managed care models of healthcare drive the dilemma of insufficient knowledge
about the menstrual cycle which marginalizes women as participants in their reproductive
healthcare decision-making. Knowledge of the menstrual cycle will place women more to the
center of their healthcare decision-making.

Knowledge of the Menstrual Cycle

The present study is now a part of the body of knowledge demonstrating that women do
not understand the menstrual cycle as well as they should. These results contribute to previous
research by showing that women can learn about the menstrual cycle and value the opportunity
to do so.

The current study also supported the findings by Moore (1995) and Koff et al. (1995) that
mothers are among the most important sources of information on the menstrual cycle with 41 of
the 72 participants (60%) rating their mothers as one of the top three sources of information
about the cycle. The importance of this finding is that, if the mothers have educated their
daughters, it is not apparent in the findings of the present study that the information exchanged
between mother and daughter is significant as evidenced by the mean on the pretest being less
than 50%. One would have to wonder about how marginalized the mothers are in their own
healthcare decision-making, and the effect that would have on their daughters.

The current study supports the 1990 research of Koff et al., whose hypothesis related to
knowledge of the menstrual cycle not being adequate, especially knowing the role of hormones.
In the current study, only 44% of women knew the function of estrogen (58% posttest), 76% on the pretest (75% posttest) understood how hormonal birth control works, 22% (62% posttest) correctly identified how follicle stimulating hormone functions, and 30% (43 % posttest) understood the importance of progesterone in the luteal phase of the menstrual cycle which is important to sustain a pregnancy.

An area of strength shown by the participants in the present study was in their ability to identify anatomical sites. Ninety-one percent of the women were able to identify the ovaries on an anatomical drawing on the pretest (95% posttest), 78% identified the uterus (83% posttest), 72% the cervix (91% posttest), and 79% the vagina (93% posttest). Interestingly, the strongest increase in score (18% pretest, 97% posttest) in the anatomy was in the identification of fimbrae, the fingerlike structures that sweep the egg into the fallopian tube. Perhaps the reason for the increase in knowledge was due to the way in which the fimbrae was described figuratively as a “fingerlike projection that sweeps the egg into the fallopian tube”. This description, coupled with a picture of the fimbrae depicting the description, might have been more memorable because it related a “fingerlike” description.

In Koff et al. (1991), 69% could define the term “ovulation”, while 85% (95% posttest) could do so in this study. However, in this study, only 44% (55% posttest) knew the signs of ovulation while 76% (85% posttest) knew that hormonal birth control prevents the release of the egg during ovulation. The signs of ovulation, i.e. basal body temperature, cervical discharge, and midcycle lower quadrant pain are among the most important signals of fertility awareness which is a hallmark for an intact menstrual cycle. The module did not have pictures of the signs of ovulation and it was only described in the “Did You Know?” section while ovulation was shown in the animation. However, on the pretest the students did not know signs of ovulation nor did
many of them know on the posttest so this is an area that might be better described in future revisions of the C-bmem.

*Methods and Effectiveness of Menstrual Cycle Education*

Over the past fifty years, product loyalty has been the goal of much of the printed material educating women about the menstrual cycle (Erchull et al., 2002). In contemporary society, the power of the feminine hygiene companies to influence women to use their products and the mainstream commercialization of pharmaceuticals are via creative advertisements on television, radio, the Internet, and the popular press. These advertisements have “just in time teaching” where women are instructed on signs and symptoms and then the products are pitched for the medications exist for all sorts of problems, not the least of which is to help women alleviate any discomforts related to their menstrual cycle, avoid menstruation for months at a time, and alleviate the discomforts of perimenopause. What women don’t consider is that their normal health is being portrayed as abnormal in the medicalization of the menstrual cycle and often the motive is profit, not necessarily their wellbeing. The C-bmem was revised from its original format in response to the critique of research about educational materials previously developed. The C-bmem was not product driven, being developed in an academic setting with no sponsoring company.

*The Ethic of Care and Servant-Leadership*

In this study, healthcare providers were ranked fifth in sources where women learned about the menstrual cycle. Only 19 of the 72 participants rank them in the top three sources. This finding does not seem congruent with the ethic of care and servant-leadership if healthcare providers are to be considered servant-leaders. Results of the present research demonstrated that the women valued acquisition of the knowledge on the menstrual cycle. By activating prior knowledge, new knowledge can be accomplished that is meaningful (Ausubel, 1963). Ausubel
saw meaning as something that did not reside in the text, but, rather, for it to meaningful the learner had to utilize internal cognitive operations. Women who learn about the menstrual cycle can relate the information accessed from the module to their own menstrual cycle experiences making the learning more meaningful.

By practicing Starratt’s virtues of responsibility, authenticity, and presence, servant leaders can help informed women find their voice in healthcare decision-making. Responsibility involves naming the problem, specifically the need to educate the patient about her menstrual cycle, and being authentic which requires presence in the relationship. When the woman experiences such encounters over a period of time she will develop an interrelationship as espoused by Gilligan (1993). Such a commitment honors the work of Greenleaf (1970) who proposed developing genuine relationships with patients by respecting their value system, listening with reflection and intention, and sharing their expertise. According to Greenleaf, such a relationship results in the women “becoming healthier, wiser, freer, and more autonomous” (p. 10). Servant-leaders who embrace the ethic of care can invite women to be front and center in their healthcare decision-making. The servant-leader will understand and be committed to recognizing and valuing the menstrual cycle as the fifth vital sign.

The Ethic of Justice

The results of all treatments clearly speak to the ethic of justice by providing a response to the ethical dilemma exposed through the ethic of critique on the lack of knowledge women have of the menstrual cycle. From an ethic of justice perspective, every woman has the right to be educated about the menstrual cycle and to be prepared for informed decision-making. She needs to be afforded this opportunity at the point of service, i.e. the practitioner’s office. As well, every woman has the right to be assured that her care provider is committed to recognizing her cycle as the “fifth vital sign” in order to partner in problem-solving variations that could be
pathological in nature. Not only does she have the right, she has the responsibility to understand her body and the impact the choices she makes will have upon it because she will bear the responsibility for the ultimate outcome.

Starratt (1991) speaks to resource allocation related to the ethic of justice as the “tapestry of ethical perspectives” (p. 200). In this study, the researcher felt the C-bmem was an educational module that could weave justice through critique and care. Time constraints and financial allocations in the healthcare system call for optimal use of resources. The current study demonstrates that women can study the module independently, in whatever format, and significantly improve in knowledge with a minimal amount of time and personnel resources, thus making the education cost-effective. Such a resource reallocation would not be terribly burdensome to the existing system, but would work to correct the flaws inherent in the failure to educate women to self-govern in healthcare decision-making. What women really need is the opportunity.

Access to healthcare in the United States is determined by one’s ability to pay for care or participate within a capitalistic model of insurance, managed care, or government-assisted programs. These groups govern the care received. In the individual practitioner/patient relationship, the patient is governed by the practitioner as determined by the leadership style of the practitioner. As the “greatest good for the greatest number” phrase abounds in the healthcare policy world, so also is “Do no harm” a motto that drives practitioners as they seek to provide what is best for their patients. Perhaps the patient’s motto can be “to thine own self be true” as she is able to self-govern as by motivation, capabilities, and opportunities for shared decision-making.
Implications for Practice

The C-bmem was developed as a dynamic and colorful computer-based module for patient education. Given the significance of the study, and noting that the women who completed the study valued the experience, it would seem a positive complement to the care provided by the servant-leader. Because the C-bmem may be utilized in practitioners’ offices where time is a challenging factor, the participants in the study were asked to evaluate if the module was too long or too short. Some respondents thought the C-bmem could easily be completed in 15-20 minutes while others felt the 30-minute time period was good for studying the information more thoroughly. None of the participants stated the time was too short. Ideally, when a woman was to seek reproductive healthcare, an initial 15-20 minute educational session using the C-bmem would be included in the visit. Along with the C-bmem, the woman, if not using hormonal contraception, could be taught to chart her cycle including the interval and duration of menstruation as well as physical changes. She would be instructed to bring the menstrual chart to her healthcare visits. The patient will benefit as she becomes familiar with her cycle and is aware of variations, while the care provider who, practicing servant-leadership, individualizes the woman’s care to her specific experience. The stewardship the woman brings to the stewardship of the servant-leader can then culminate in a symbiotic relationship of optimal healthcare.

Several formats can be used for the presentation of the C-bmem in the office setting. Many offices have educational programs running in the waiting room which might be an option especially in a women’s health setting. It can be used in a DVD format or as a CD on a laptop or desktop computer. Because the module could be placed on the Internet, a patient with Internet access might also be referred to the module before coming to the appointment saving time in the office. It is also important to point out that in support of the schema theory of learning, women will most certainly not absorb all the information on the module in one sitting. The information
gained can be added to by watching again or by additional information gathered by just in time teaching by the care provider.

The use of the C-bmem can take place in a variety of settings where women are educated about their menstrual cycle, i.e. junior high/high school, college courses, and prenatal education classes. It can be used as either a CD or DVD format. Faculty could also access the module on the Internet.

Suggestions for Further Research

There were limitations of the study that need to be considered for future research. One of the limitations of the information presented was the grade 12 reading level. However, by having a narrative component, participants were able to hear the words pronounced, and receive instruction on terminology related to the anatomy and hormonal components of the information. Any effect of the three treatments in improving knowledge about the menstrual cycle may have been confounded by statistical regression, given that the pretest means were very low.

Although it might have been of value to know the ethnicity and race of participants, the population was mostly Caucasian which would probably have precluded any significant finding. Also, the participants were not asked to rate their comfort level with the use of the computer which might have impacted their participation or motivation. Another factor that occurred was that during the visits to classrooms to invite students to participate in the study, some faculty presented extra credit as an incentive while others did not.

This study will need to be replicated in the future with a larger sample size with possible factor analysis to isolate subscales on the knowledge variable such as anatomy, physiology, and application of information. A sharper contrast needs to be developed between treatments to enhance the evaluation of the module in order to determine the extent to which any significant treatment effects can be generalized. For future research the module might be revised using
Mayer’s (1997) theory of multimedia learning consisting of five principles for developing computer-based multimedia education. The principles were: (a) multiple representation principle meaning presenting an explanation in words and pictures is better than presenting in words alone, (b) contiguity principle means that rather than presenting visual and words separately, it is better to present together, (c) split attention principle refers to using narration rather than visual on-screen text, (d) individual differences principle states that the first three principles work better for low-knowledge than high-knowledge learners, and for high-spatial learners rather than for low-spatial learners, and (e) the coherence principle means it is better to use fewer than more extraneous words and pictures. Retrospectively, by chance, three of the principles that were used included the multiple representation principle by providing a text base along with visual information in order to assist the learner in achieving an image base, the contiguity principle by presenting visual and words together, and, finally, the individual differences principle which was maintained because the subjects had a low level of knowledge on the menstrual cycle as manifested in the results of the pretest. Hopefully, using these adaptations in future research would show higher impact.

The next phase of this research could involve examining knowledge gained in an office setting using the C-bmem. An interesting research topic might be to see how much women can understand of the technical terminology. Rather than find “simple” words to describe the anatomy and physiology of the menstrual cycle, it might be empowering for women to learn actual sites and names of hormones thus respecting their right to understand their body more fully rather than “dummying” down information. Adding information on medicalization, i.e. their experience with normal experiences seen by the patient as a medical problem, could be a part of the research. Placing more of a time span between the treatment and posttest could be considered in the next phase of the research. As well, a study on if, and how, the menstrual cycle
is valued by women would be of interest. It would also be beneficial to continue studying topics related to women’s health using Starratt’s model or the ethics of critique, justice, and care. Future research could examine why women use the Internet less often than other sources of education on the menstrual cycle.

Summary

This dissertation examined the dilemma that exists in today’s healthcare environment where some women participate in reproductive decision-making without adequate knowledge of their menstrual cycle. It is especially important because women who are essentially healthy are placing medications in their bodies without longitudinal studies to support such interventions. Because they live in a society where their healthcare is so strongly influenced by marketization and medicalization, they must find their power in making best healthcare choices for themselves. The ultimate purpose for this research was to develop, test, and implement an effective learning module on the menstrual cycle to help them build a foundation upon which to make healthcare decisions. Although the improvement in knowledge was not statistically significantly between treatments, the study contributes significantly to the field of women’s health by revealing that women do lack knowledge of the menstrual cycle, women can gain significant knowledge in a short period of time, and women value the knowledge acquired. Because of the cumbersome nature of the IM and PP modules in relationship to number of pages and number of slides, the CBmem might be more attractive to the learner and could be used in a variety of ways in the healthcare practitioner’s office and other educational settings.
REFERENCES


Mayer, R.E., Heiser, J., & Lonn, S. Cognitive constraints on multimedia learning: When presenting more material results in less understanding. *Journal of Educational Psychology, 93*(1), 187-198.


APPENDIX A. EDUCATIONAL MODULES

1. Computer-based Information Module (C-bmem)
2. Information Module (IM)
3. PowerPoint Module (PP)

The modules include the same pictures and text except for two pictures on the C-bmem, one that shows the cyclic nature of the menstrual cycle and the other shows the four stages of the endometrial lining of the endometrial cycle. The C-bmem was viewed by the participants on the computer. The IM was in printed format and the PP was a power point module viewed on the computer. The CD C-bmem is available upon request because it cannot be inserted into this electronic dissertation.
A WOMAN’S WORLD:
DISCOVERING THE DYNAMIC MENSTRUAL CYCLE

By
Joan L. Moon, MSN, CNM
Assistant Professor of Nursing
University of Toledo College of Nursing

Carlos Baptista, MD, PhD
Assistant Professor of Medicine
University of Toledo College of Medicine

Center for Creative Instruction

WELCOME TO
A WOMAN’S WORLD:
DISCOVERING THE DYNAMIC MENSTRUAL CYCLE

The menstrual cycle is a network of hormones within the female anatomy that can determine a woman’s fertility, health, and sense of well-being. As a woman, it is important for you to know about your menstrual cycle so that when you visit your healthcare provider you can participate in making informed decisions. Examples of informed decision-making would include planning or preventing a pregnancy, using hormone replacement therapy, knowing how “unsafe” sex could impact your reproductive organs, understanding discomforts of the menstrual cycle, and knowing that an abnormal menstrual cycle can be a sign of a physical problem such as eating disorders, pituitary tumors, and uterine or ovarian tumors.
INTRODUCTION

A young girl’s first period can occur as early as 8-9 years-of-age or as late as 17-years and is called “menarche”. Her period usually occurs within one or two years after puberty (breast enlargement and growth of hair under her arms). She might have a period one month but not the next. It usually becomes regular within a year with perhaps one or two days variation. The average time between periods is 28 days but can range from 21-45 days.

The average blood flow lasts from 4-6 days again with variations among individual women. If a young woman does not have a period by the age of 17, she should contact her healthcare provider.

PERIMENOPAUSE/MENOPAUSE

After years of having periods, a woman enters a “perimenopausal” phase of her life which can occur in her late 30’s or 40’s and last several years. During this time, her period becomes less frequent with changes in the amount of blood flow and length of her period. At some point she will experience what is called “menopause” which is her last period. The average age of menopause is 51 and can only be declared if a woman has had no period for a year after that last period. Any bleeding after menopause should be reported to her care provider.
The Menstrual Cycle System

- Hypothalamic/Pituitary Cycle
- Ovarian Cycle
- Endometrial Cycle

HYPOTHALAMIC/PITUITARY CYCLE - BRAIN ANATOMY

The hypothalamus is a small mass of nerve tissue located at the base of the brain and is where the menstrual cycle hormones begin. The pituitary gland is the small lobe hanging from the hypothalamus.
HORMONAL FUNCTIONS OF THE HYPOTHALAMIC/PITUITARY CYCLE

Hormones are substances which go from where they are produced through the bloodstream to another part of the body to increase or decrease activity of that part. In response to low levels of the female sex hormones, estrogen and progesterone, the hypothalamus is signaled to release Gonadotropin Releasing Hormone (GnRH) to the pituitary gland. Upon stimulation by GnRH, the pituitary gland secretes Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH) to the ovaries to stimulate the growth of the follicles which contain eggs.

Did You Know?

1. Because the hypothalamus is a mass of nerve endings interacting with many other nerve endings, stress, eating disorders, and excessive exercise can interfere with the ability of the hypothalamus to stimulate the pituitary gland and the menstrual cycle can be interrupted.
OVARIAN CYCLE - FEMALE REPRODUCTIVE ANATOMY

The anatomy within the female pelvis consists of:

1. There are two ovaries, one on each side of the pelvic cavity. Inside the ovaries are 300-500,000 primordial eggs. Each egg, called an "ovum", resides within a sac known as a "follicle".
2. Two fallopian tubes extend from the top of the uterus to the ovaries. The end of the tubes closest to the ovaries have finger-like projections called "fimbriae".
3. The uterus is pear shaped. The inner lining is called the "endometrium". The lower end of the uterus is the "cervix" which opens into the vagina.
4. The vagina is a hollow muscular passageway also known as the "birth canal".

There are two phases of the ovarian cycle. The first phase is the "follicular" phase which lasts about 14 days. During the follicular phase, 3-30 eggs grow within the ovary. One takes the lead and is termed the "graafian follicle". On approximately day 14, a large amount of luteinizing hormone (LH) from the pituitary gland goes to the graafian follicle resulting in the follicle bursting open and the egg being swept by fimbrae into the fallopian tube. This is "ovulation". The second half of the ovarian cycle is the "luteal" phase which lasts 14 days. The egg is out of the ovary in the luteal phase and is either in the fallopian tube or the uterus.

After ovulation when the egg leaves the graafian follicle, the follicle folds in on itself and becomes the "corpus luteum" producing progesterone.
Did You Know?

1. The luteal phase lasts 14 days after ovulation and is the most constant phase of the ovarian cycle. The follicular phase is at the beginning of the cycle and varies in length which is why women cannot be sure of when they can become pregnant.

2. The egg will stay alive for about 24 hours after ovulation and the sperm will survive for three days.

3. A woman has about three fertile days during her menstrual cycle making pregnancy possible.

4. A woman can identify signs of ovulation including abdominal discomfort (mittelschmerz), thin/stretchy mucous (like egg white), and a small amount of bleeding. Her basal body temperature (requiring a special thermometer) also rise after ovulation.

HORMONAL FUNCTIONS OF THE OVARIAN CYCLE

Within the ovarian cycle estrogen is produced by the follicles during the follicular phase and progesterone is produced by the corpus luteum in the luteal phase. The hormones travel to the uterus to prepare the endometrial lining for implantation of a fertilized egg.
Did You Know?

1. Hormonal birth control acts by preventing the release of the egg from the follicle during ovulation. Progestin only can also cause the mucous around the cervix to become thick thus preventing sperm from entering the uterus. The lining of the uterus can also be changed to prevent implantation of a fertilized egg.

2. During the last week of the luteal phase, a woman may experience symptoms of feeling depressed, tense, anxious, a lack of energy, change in appetite, craving certain foods, or sleep disorders. Experiencing a grouping of these symptoms is known as “premenstrual syndrome” (PMS) and can range from mild to severe. A woman care provider should be aware of how the menstrual cycle impacts a woman’s physical and emotional well-being.

3. Complex carbohydrates may help with symptoms of PMS such as sugar cravings and fatigue.

ENDOMETRIAL CYCLE – FOUR PHASES

The menstrual phase is the time of a woman’s menses or “period” and lasts about 1-4 days during which time a portion of the endometrial lining is shed if a pregnancy has not occurred. The menstrual cycle begins on the first day of bleeding.
ENDOMETRIAL CYCLE – FOUR PHASES

During the proliferative phase (about days 5 to 13), estrogen from the follicle goes to the lining and builds up the blood supply.

ENDOMETRIAL CYCLE – FOUR PHASES

The secretory phase follows when progesterone from the corpus luteum travels to the endometrial lining and further increases the blood supply. The lining looks like plush velvet (about days 15-26). The lining is now prepared to nourish a fertilized egg (embryo).
ENDOMETRIAL CYCLE – FOUR PHASES

If an egg is not fertilized, the ischemic phase occurs (about days 27-28) when the levels of estrogen and progesterone drop cutting off the blood supply. In response to the low levels of estrogen and progesterone, the menstrual cycle begins again.

Did You Know?

1. Prostaglandins are hormones produced in the uterine lining which have an inflammatory action causing cramping during menstruation known as “dysmenorrhea”. The woman can experience a range of symptoms from mild cramping to debilitating pain.

2. Over-the-counter label use of nonsteroidal antiinflammatory drugs (NSAIDS) such as ibuprofen can help alleviate dysmenorrhea because it interferes with the production of prostaglandins.
NONFERTILIZATION

In review, there are four major hormones of the menstrual cycle. Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH) go from the pituitary gland to the ovaries. Follicles are stimulated by FSH. One grows to become the graafian follicle and is stimulated by LH to release the egg from the follicle. This is ovulation. While the follicle is in the ovary it secretes estrogen and after ovulation the egg is outside the ovary when the graafian follicle becomes the corpus luteum and secretes progesterone. These hormones act upon the lining of the uterus to build a rich blood supply to nourish an implanted embryo. If no pregnancy takes place the levels of estrogen and progesterone drop, uterine lining is shed and the menstrual cycle begins again.
NONFERTILIZATION

In review, there are four major hormones of the menstrual cycle. Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH) go from the pituitary gland to the ovaries. Follicles are stimulated by FSH. One grows to become the graafian follicle and is stimulated by LH to release the egg from the follicle. This is ovulation. While the follicle is in the ovary it secretes estrogen and after ovulation the egg is outside the ovary when the graafian follicle becomes the corpus luteum and secretes progesterone. These hormones act upon the lining of the uterus to build a rich blood supply to nourish an implanted embryo. If no pregnancy takes place the levels of estrogen and progesterone drop, uterine lining is shed and the menstrual cycle begins again.
NONFERTILIZATION

In review, there are four major hormones of the menstrual cycle. Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH) go from the pituitary gland to the ovaries. Follicles are stimulated by FSH. One grows to become the graafian follicle and is stimulated by LH to release the egg from the follicle. This is ovulation. While the follicle is in the ovary it secretes estrogen and after ovulation the egg is outside the ovary when the graafian follicle becomes the corpus luteum and secretes progesterone. These hormones act upon the lining of the uterus to build a rich blood supply to nourish an implanted embryo. If no pregnancy takes place the levels of estrogen and progesterone drop, uterine lining is shed and the menstrual cycle begins again.

NONFERTILIZATION

In review, there are four major hormones of the menstrual cycle. Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH) go from the pituitary gland to the ovaries. Follicles are stimulated by FSH. One grows to become the graafian follicle and is stimulated by LH to release the egg from the follicle. This is ovulation. While the follicle is in the ovary it secretes estrogen and after ovulation the egg is outside the ovary when the graafian follicle becomes the corpus luteum and secretes progesterone. These hormones act upon the lining of the uterus to build a rich blood supply to nourish an implanted embryo. If no pregnancy takes place the levels of estrogen and progesterone drop, uterine lining is shed and the menstrual cycle begins again.
FERTILIZATION

After ovulation the egg is swept into the fallopian tube by the fimbriae. Sperm travels from the vagina through the uterus into the tubes. Fertilization may take place within 12 hours of ovulation. If it does occur there will be no menstruation because levels of estrogen and progesterone will remain elevated to provide an enriched endometrial lining for implantation of the developing embryo. The menstrual cycle has completed it’s dynamic job!
FERTILIZATION

After ovulation the egg is swept into the fallopian tube by the fimbriae. Sperm travels from the vagina through the uterus into the tubes. Fertilization may take place within 12 hours of ovulation. If it does occur there will be no menstruation because levels of estrogen and progesterone will remain elevated to provide an enriched endometrial lining for implantation of the developing embryo. The menstrual cycle has completed its dynamic job!
FERTILIZATION

After ovulation the egg is swept into the fallopian tube by the fimbriae. Sperm travels from the vagina through the uterus into the tubes. Fertilization may take place within 12 hours of ovulation. If it does occur there will be no menstruation because levels of estrogen and progesterone will remain elevated to provide an enriched endometrial lining for implantation of the developing embryo. The menstrual cycle has completed its dynamic job!
Did You Know?

1. A fertilized egg can sometimes implant outside of the uterus, usually within the fallopian tube. This is known as an “ectopic” pregnancy and is a medical emergency.

2. Some women experience problems with maintaining a pregnancy because of a low level of progesterone during the luteal phase when it should be a high level. This is known as a “luteal phase defect”.

The end

Thank you, any questions?
APPENDIX B

PARTICIPANT BACKGROUND INFORMATION

Client No.: ________________________

Please respond to each item by filling in requested information or checking appropriate space.

1. Age: _____

2. Year in school  
   a. Freshman___  
   b. Sophomore___  
   c. Junior___  
   d. Senior___

3. Please indicate the sources from which you learned about the female reproductive system  
   (PLEASE RANK the top THREE sources that were most meaningful regarding this education with 1 being most meaningful):
   
   a. ______ Have not learned about
   b. ______ Mother
   c. ______ Elementary/Jr. High School
   d. ______ High School
   e. ______ Friends
   f. ______ Television
   g. ______ College course
   h. ______ Internet
   i. ______ Health Care Provider
   j. ______ Siblings
   k. ______ Books/pamphlets/magazines

4. Age when first period occurred: _____

5. Regularity of menses (period):  
   a. Regular_____  
   b. Not Regular____

6. Frequency of menses (period):  
   a. _______ Fewer than every 18 days
   b. _______ 18-35 days
   c. _______ More than every 35 days

7. Length of menses (period)  
   a. 1-2 days_____  
   b. 3-5 days_____  
   c. more than 6 days_____

8. How would you rate your menstrual flow?  
   a. Mild_____  
   b. Moderate_____  
   c. Heavy_____

9. Symptoms associated with menses: If any of these apply, mark X under bothersome or debilitating.

<table>
<thead>
<tr>
<th></th>
<th>Bothersome</th>
<th>Interferes with Daily Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Cramping:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Breast tenderness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Bloating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Mood swings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Foot craving</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. Headaches</td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. Acne</td>
<td></td>
<td></td>
</tr>
<tr>
<td>h. Dizziness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Diarrhea</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. Contraceptive Use
   a. _____ Have never used
   b. _____ Have used in past
   c. _____ Currently use

11. Identify the reasons for using contraception (check all that apply)

<table>
<thead>
<tr>
<th></th>
<th>Past Use</th>
<th>Current Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. To prevent pregnancy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. To help with menstrual discomforts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. To prevent sexually transmitted disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. To control # periods a year (Seasonale)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12. Method(s) of Contraception being used in the past and present (check all that apply)

<table>
<thead>
<tr>
<th></th>
<th>Past Use</th>
<th>Current Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Condoms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Pill</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Seasonale</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Nuva ring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. Deprovera</td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. Patch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>h. Diaphragm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Withdrawal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>j. IUD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>k. Other (state)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
13. What is your cumulative college grade point average? Under 1.99 _____ 2.0-2.49 ___ 2.50-2.99 ___
_____ 3.0-3.49 ___ 3.50-4.00 ___

14. Education level of your mother:
   a. some high school ___
   b. completed high school____
   c. some college___
   d. Completed college___
   e. some graduate/professional studies ___
   f. completed graduate/professional studies___

15. Education level of your father:
   a. some high school ___
   b. completed high school____
   c. some college___
   d. Completed college___
   e. some graduate/professional studies ___
   f. completed graduate/professional studies___

COMPLETE AFTER THE EDUCATIONAL SESSION

16. Within the last week did you do any additional reading on the menstrual cycle?  a. yes___ b. no___

17. Will the knowledge gained in this educational experience be of value to you in the future? (Circle what applies to you)
APPENDIX C

PRETEST

1-4. Match the anatomical structures below (numbered) with the appropriate name.

Mark appropriate letter on electronic answer form.

a. Uterus
b. Fallopian tube
c. Ovary
d. Cervix
e. Vagina

5. A small mass of nerve endings in the brain sensitive to the effects of stress, anorexia, and extreme exercise is:

a. Pituitary gland
b. Hypothalamus
c. Brain stem
d. Medulla
6. A test that screens women for cervical cancer is called:
   a. Mammogram
   b. pap smear
   c. colposcopy
   d. endometrial ablation

7. Fertilization of the egg usually takes place in the
   a. Fallopian tube
   b. Ovaries
   c. Endometrium
   d. Uterus

8. A function of estrogen in the ovarian cycle is to
   a. Prepare the endometrial lining
   b. Develop the egg
   c. Prevent menstruation
   d. Prevent ovulation

Match the following hormones with their site of production. Mark appropriate letter on electronic answer form.

9. Estrogen       a. Corpus luteum
10. Progesterone  b. Hypothalamus
11. Follicle Stimulating Hormone  c. Pituitary gland
12. Prostaglandins  d. Endometrium
                       e. Graafian follicle
13. The term for the event when an egg is released from the ovaries is called
   a. Ovulation
   b. Pregnancy
   c. Menstruation
   d. Maturation

14. Before a woman becomes pregnant one vaccine she should have is
   a. Chickenpox
   b. Hepatitis B
   c. Rubella
   d. Mumps

15. Another name for the egg in the ovary is
   a. Follicle
   b. Ovum
   c. Germ cell
   d. Sac

16. Hormonal birth control acts by
   a. Releasing of the egg during ovulation
   b. Penetrating the egg
   c. Speeding up the sperm
   d. Preventing release of the egg
17. The phases within the ovarian cycle of the menstrual cycle system are
   a. Follicular, luteal
   b. Secretory, proliferative
   c. Ischemic, menstrual
   d. Luteal, ischemia

18. Painful menstruation is known as
   a. Dysmenorrhea
   b. Premenstrual syndrome
   c. Dysphoric menstrual syndrome
   d. Amenorrhea

19. The release of prostaglandins in the endometrium is the main cause of
   a. Bleeding
   b. Bloating
   c. Cramping
   d. Depression

20. During the ovarian cycle, how many follicles are stimulated by follicle
    stimulating hormone?
   a. 1
   b. 3-30
   c. 50-100
   d. Greater than 100
Match the following life events with their definitions. Mark appropriate letter on electronic answer form.

21. Puberty a. A girl’s first period
22. Perimenopause b. A women’s last period
23. Menarche c. The years preceding a woman’s last period
24. Menopause d. The growth of breasts and axillary hair

   e. The years preceding and following a woman’s last period

25. Complex carbohydrates may help with which symptoms of premenstrual syndrome
   a. Anxiety, mood swings, headaches
   b. Sugar cravings, fatigue
   c. Painful menstruation
   d. Bloating

26. What is the approximate amount of time an egg will stay alive after ovulation?
   a. 10 hours
   b. 12-24 hours
   c. 72 hours
   d. one week

27. Sperm can survive as long as
   a. 3 days
   b. 4 days
   c. 5 days
   d. 6 days
28. Approximately how many fertile days does a woman have each month during the menstrual cycle?
   a. 3
   b. 5
   c. 7
   d. 10

29. Signs of ovulation include
   a. thin discharge, midcycle pain
   b. thick discharge, decreased temp
   c. thick discharge, increased pain
   d. no discharge, increased temp

30. During the luteal phase of the ovarian cycle, it is important to have an adequate level of
   a. Progesterone
   b. follicle stimulating hormone
   c. luteinizing hormone
   d. prostaglandins

31. The follicular phase of the ovarian cycle is highly dependent upon hormones from the hypothalamic/pituitary cycle because the hormones.
   a. Inhibit the release of the egg
   b. Stimulate the egg to grow
   c. Promote fertilization
   d. Inhibit ovulation

32. In being aware of her menstrual cycle, a woman knows that the
a. menstrual cycle begins on the last day of bleeding  
b. menstrual cycle begins on the first day of bleeding  
c. follicular phase is consistent in length  
d. luteal phase is inconsistent in length

33. With ovulation, the fingerlike structures that sweep the egg into the fallopian tube is called the
   a. Cilia  
   b. Fimbriae  
   c. Ampulla  
   d. Ectopy

34. A test women can have to determine if she has the gene for breast cancer is the
   a. Brca 1  
   b. Mammogram  
   c. Ultrasound  
   d. Biopsy

35. A new vaccine on the market is meant to protect young women against
   a. Breast cancer  
   b. Endometrial cancer  
   c. Cervical cancer  
   d. Uterine cancer
36. Smoking is a cofactor with which cancer
   a. Breast cancer
   b. Endometrial cancer
   c. Cervical Cancer
   d. Uterine Cancer
POSTTEST

1-4. Match the anatomical structures below (numbered) with the appropriate name.
Mark appropriate letter on electronic answer form.

b. Uterus
b. Fallopian tube
c. Ovary
f. Cervix
g. Vagina

5. A small mass of nerve endings in the brain sensitive to the effects of stress, anorexia, and extreme exercise is:

a. Pituitary gland
b. Hypothalamus
c. Brain stem
d. Medulla

6. A test that screens women for cervical cancer is called:

a. Mammogram
b. pap smear
c. colposcopy
d. endometrial ablation
7. Fertilization of the egg usually takes place in the
   a. Fallopian tube
   b. Ovaries
   c. Endometrium
   d. Uterus

8. A function of estrogen in the ovarian cycle is to
   a. Prepare the endometrial lining
   b. Develop the egg
   c. Prevent menstruation
   d. Prevent ovulation

Match the following hormones with their site of production. Mark appropriate letter on
electronic answer form.

9. Estrogen  a. Corpus luteum
10. Progesterone  b. Hypothalamus
11. Follicle Stimulating Hormone  c. Pituitary gland
12. Prostaglandins  d. Endometrium
e. Graafian follicle
13. The term for the event when an egg is released from the ovaries is called
   a. Ovulation
   b. Pregnancy
   c. Menstruation
   d. Maturation

14. Another name for the egg in the ovary is
   a. Follicle
   b. Ovum
   c. Germ cell
   d. Sac

15. Hormonal birth control acts by
   a. Releasing of the egg during ovulation
   b. Penetrating the egg
   c. Speeding up the sperm
   d. Preventing release of the egg

16. The phases within the ovarian cycle of the menstrual cycle system are
   a. Follicular, luteal
   b. Secretory, proliferative
   c. Ischemic, menstrual
   d. Luteal, ischemia
17. Painful menstruation is known as
   a. Dysmenorrhea
   b. Premenstrual syndrome
   c. Dysphoric menstrual syndrome
   d. Amenorrhea

18. The release of prostaglandins in the endometrium are the main cause of
   a. Bleeding
   b. Bloating
   c. Cramping
   d. Depression

19. During the ovarian cycle, how many follicles are stimulated by follicle stimulating hormone?
   a. 1
   b. 3-30
   c. 50-100
   d. Greater than 100

Match the following life events with their definitions. Mark appropriate letter on electronic answer form.

20. Puberty  a. A girl’s first period
21. Perimenopause b. A woman’s last period
22. Menarche  c. The years preceding a woman’s last period
23. Menopause d. The growth of breasts and axillary hair
   e. The years preceding and following a woman’s last period

24. Complex carbohydrates may help with which symptoms of premenstrual syndrome
a. Anxiety, mood swings, headaches
b. Sugar cravings, fatigue
c. Painful menstruation
d. Bloating

25. What is the approximate amount of time an egg will stay after ovulation?
   a. 10 hours
   b. 12-24 hours
   c. 72 hours
   d. one week

26. Sperm can survive as long as
   a. 3 days
   b. 4 days
   c. 5 days
   d. 6 days

27. Approximately how many fertile days does a woman have each during the menstrual cycle?
   a. 3
   b. 5
   c. 7
   d. 10
28. Signs of ovulation include
   a. thin discharge, midcycle pain
   b. thick discharge, decreased temp
   c. thick discharge, increased pain
   d. no discharge, increased temp

29. During the luteal phase of the ovarian cycle, it is important to have an adequate level of
   a. Progesterone
   b. follicle stimulating hormone
   c. luteinizing hormone
   d. prostaglandins

30. The follicular phase of the ovarian cycle is highly dependent upon hormones from the hypothalamic/pituitary cycle because the hormones
   a. Inhibit the release of the egg
   b. Stimulate the egg to grow
   c. Promote fertilization
   d. Inhibit ovulation

31. In being aware of her menstrual cycle, a woman knows that the
   a. menstrual cycle begins on the last day of bleeding
   b. menstrual cycle begins on the first day of bleeding
   c. follicular phase is consistent in length
   d. luteal phase is inconsistent in length
32. With ovulation, the fingerlike structures that sweep the egg into the fallopian tube is called the

   a. Cilia
   b. Fimbrae
   c. Ampulla
   d. Ectopy
APPENDIX D

INVITATION LETTER

As a doctoral student in the College of Education, Division of Educational Administration and Leadership Studies, I am conducting a research study on women’s health education. If you are a female, 18 years-of-age-or-older, you are invited to participate in the study which will last approximately 1 to 1¼ hours. The consent form background information form will take about five to 10 minutes. A pretest will be given which will take about 15 minutes and will be followed by an educational session on women’s health. At the completion of the session, you be eligible

The anticipated risks to you are no greater than those normally encountered in daily life. This study may benefit women as they learn more about their reproductive health. Your participation in this study is completely voluntary and you can withdraw from it or refrain from answering any questions without penalty or explanation. Your confidentiality will be assured by having a numerical number on the background information, pretest, and posttest forms. Your name will be on the consent form but not on any other forms. All forms will be stored in a locked file cabinet in my office which is located at the University of Toledo College of Nursing, Health Sciences Campus. Results will be presented only in summary form. Your identity will be protected and responses will not be revealed in any publication or presentation of study results.
If you have any questions or comments about this study, you can contact me, Joan Moon, at 419-308-3714, joan.moon@utoledo.edu, or Dr. Judy Jackson May, my doctoral advisor, at 419-372-7373, judyjac@bgsu.edu. You also have the right to request a summary or copy of the results of the study by emailing me after completion of the study which will be May, 2007. You may also contact the Human Subject’s Review Board at 419-372-7716 if you have any questions or concerns about your rights as a research participant. You will receive a copy of this consent document for your records.
After reading the consent form and asking any questions I have had regarding the procedures of the research project and my responsibilities, I give my consent to participate in this research study on women’s health.

____________________________________ ________________
Participant      Date

____________________________________ ________________
Joan L. Moon, MSN, CNM    Date
Doctoral Student

____________________________________ ________________
Judy Jackson May, Ph.D.    Date
Doctoral Advisor