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**Implementing a New Training Approach:  
Pilot Test of ModCal™ in Zimbabwe**

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## ABBREVIATIONS AND ACRONYMS

ASTD	American Society for Training and Development
CAL	Computer-assisted learning
CBT	Competency-based training
COC	Combined oral contraceptive
FP	Family planning
GTI	Genital tract infection
ICC	In-country counterparts
IMM	Interactive multimedia
ITO	Information Technology Office
IUD	Intrauterine device
LAS	Language Assessment Scales®
LT/P	Long-term/permanent
ModCal	Modified computer-assisted learning™
MOH/CW	Ministry of Health/Child Welfare
OJT	On-the-job training
PDO	Program Development Officer
PST	Preservice training
REO	Research and Evaluation Office
RH	Reproductive health
RO	Regional Office
USAID	United States Agency for International Development
ZNFPC	Zimbabwe National Family Planning Council

## EXECUTIVE SUMMARY

Modified computer-assisted learning (ModCal™) is JHPIEGO's newest option for implementing competency-based training (CBT) in reproductive health. A pilot test of ModCal for the intrauterine device (IUD), conducted in May 1996 at the Mpilo School of Midwifery in Bulawayo, Zimbabwe, determined the acceptability of computer-assisted learning (CAL) and the feasibility for implementing it in an institutional setting. The goal was to assess how participants with no prior computer experience responded to computer-based learning about IUDs.

The CAL workstations were installed and the pilot test conducted without any problems. The ModCal software ran well with only minor technical difficulties, and no additional computer support from an outside agency was required at any point during the pilot test.

Thirty-eight participants (midwifery students, tutors and practicing nurses), completed a 5-module prototype. The program's acceptability and usability were determined through knowledge questionnaires, interviews and observations. Participants learned quickly how to use the pointing device to navigate through the IUD modules. Of the 38 participants, 24 (63%) chose to start with the first module; however, only 10 participants completed the modules in sequence.

The knowledge assessment consisted of 35 multiple-choice items. Pre- and post-test questions were rearranged, but the distractors were the same. Pretest scores ranged from 34 to 74% and post-test scores from 54 to 97% with means of 54% and 78%, respectively. Scores increased significantly on the post-test (mean change = 24%;  $t = 13.9$ ,  $p < 0.0001$ ). Using a score of 85% (the passing score for the knowledge component of ZNFPC's IUD certification process for service providers in Zimbabwe), 13 nurses scored 85% or better on the post-test.

Prior computer use was not a factor in learning the content or in being able to maneuver through the program since no participant had ever used a computer prior to this pilot test. Participants praised the program's self-paced aspect—largely because they felt they controlled the pace of the learning and could pause or review sections or modules at any time. Tutors emphasized that they would have more time to conduct and coach hands-on demonstrations with students, if standardized information were learned from interactive multimedia modules rather than in the classroom.

An item analysis was conducted on the post-test results to identify effective and ineffective items and to make recommendations regarding the revision of items for future use in ModCal packages. The average item difficulty was 76.6%. Three items with very low difficulty levels were removed and the average difficulty level increased to 80.7%. The average discrimination level was 0.28.

This successful pilot test helps alleviate doubts about the applicability of CAL in Africa. Key representatives from a variety of stakeholder organizations—including Ministry of Health senior managers, donors, and representatives from implementing organizations—acknowledged that this pilot test succeeded in implementing CAL and in demonstrating that knowledge can be transferred using the CAL approach. Further, ModCal is an appealing new training approach. By using computer technology to maximize training efficiency, trainers can redirect their time—which is scarce—to areas that depend upon intensive trainer-learner interaction. ModCal uses the computer to enable participants to absorb new knowledge at their own pace so that more trainer time is available for skills practice. In a relatively sophisticated country like Zimbabwe, the potential for institutionalizing ModCal is great.



# Implementing a New Training Approach: Pilot Test of ModCal™ in Zimbabwe

## INTRODUCTION

The time and resources required to provide group-based training courses in long-term/permanent (LT/P) family planning (FP) methods can greatly limit a country's ability to increase access to FP services. Realizing this, JHPIEGO began to develop alternative training approaches that would provide a variety of ways for countries to train competent service providers more efficiently and effectively, and thereby increase access to FP services. Modified computer-assisted learning (ModCal™)—one of the newest training approaches—was developed to increase training efficiency by maximizing limited trainer resources (Bertrand and Gaffikin 1993).

By 1994, FP program achievement in Zimbabwe had reached a plateau; however, LT/P method use remained low. This circumstance stimulated a re-examination of the training interventions being used to increase the number of service providers competent to provide LT/P methods, specifically the IUD, and provided an opportunity to examine ModCal's usefulness. In May 1996, ModCal was pilot tested in Zimbabwe to examine the feasibility of implementing computer-assisted learning (CAL) in a developing country setting.

## BACKGROUND

### ModCal

How can standardized, up-to-date reproductive health/family planning (RH/FP) clinical training be delivered in a cost-effective manner? Finding the answer to this question is one of the most critical challenges facing RH/FP educators in the developing world. In JHPIEGO's range of training-based solutions for this challenge, ModCal is the *newest* training approach. ModCal is a modified computer-assisted learning approach that has been incorporated into humanistic competency-based training (CBT)—which is the hallmark of JHPIEGO'S clinical RH/FP training packages.<sup>1</sup> Interactive multimedia (IMM) modules are used in conjunction with hands-on clinical practice to provide either self-paced or minimum-guidance learning packages that can multiply the effectiveness of existing training staff, increase the efficiency of training, and ensure standardized, up-to-date information transfer. With the need for RH/FP care escalating at the same time that funding for RH/FP training is shrinking, ModCal offers a flexible way to prepare large numbers of competent service providers.

Although CAL is a logical and necessary extension of existing training programs, it cannot replace human interaction in skills training (Fabius, Grissom and Fuentes 1994). Recognizing this, JHPIEGO has adopted a system that combines the advantages of CAL (flexibility, standardization, and cost-effectiveness) with the humanistic training elements (observation, practice, coaching and use of models) that highlight JHPIEGO's CBT approach.

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<sup>1</sup> For a detailed description of JHPIEGO's competency-based approach to training, see Sullivan RS. 1995. *The Competency-Based Approach to Training*. Strategy Paper #1. JHPIEGO Corporation: Baltimore, Maryland.

The ModCal learning experience retains the integral CBT components (i.e., role plays, classroom and clinical demonstrations, clinical practice, and competency assessment). In addition, IMM modules provide standardized information that serves as the theoretical base for learning new skills (e.g., IUD insertion and removal). IMM modules do not replace clinical trainers. In fact, use of these modules gives trainers more time to interact with participants. Because participants receive standardized information from the IMM modules rather than from lectures, the clinical trainers who would normally give these lectures now have more time to spend on role plays, demonstrations and coaching during hands-on practice.

Incorporating ModCal into CBT enables trainers to make better use of limited training time. In the traditional group-based training situation, the trainer works with a small number of participants, taking them through the entire learning process from knowledge acquisition to hands-on practice for learning skills. The information and skills transfer is limited, however, to that small group during that period of training. With the ModCal approach, the trainer uses the flexibility provided by the IMM modules to schedule time more effectively to train a significantly larger number of participants.

In situations where FP caseloads for IUD services are low, using ModCal can help ensure that all participants have the opportunity to interact with real clients. Because participants go through training at their own pace instead of moving through the process as a group, they will reach the competency assessment stage at different times. As a result, the available pool of clients will be split among fewer participants at any one time thereby increasing the number of clients with whom each participant can interact.

## **Country Situation**

### ***FP Use and Access***

Zimbabwe has one of the most successful FP programs in sub-Saharan Africa. The 1992 drought and the Economic Structural Adjustment Programme have had a significant impact both on desired family size and availability of health resources and financing. As a result of these two influential factors, the Ministry of Health and Child Welfare(MOH/CW) has stressed the use of FP to limit rather than space births. According to the 1994 *Zimbabwe Demographic and Health Survey*, the total fertility rate was 4.39, down from 5.49 documented in the 1988 *Demographic and Health Survey*. The contraceptive prevalence rate is now 48%, of which 42% reflects the use of modern methods, an increase in modern method use from 36% in 1988.

Based on these statistics, it would appear that the Zimbabwe national FP program has, in general, been effective in promoting acceptance and use of contraception to limit births. The distribution of modern methods used, however, is skewed. Of all currently married women,

- ◆ 52% are using no method
- ◆ 6% are using traditional methods

- ◆ 33% are using combined oral contraceptives.<sup>2</sup>
- ◆ 9% are using the following methods: injectable contraceptives (3.2%), condoms (2.3%), female sterilization (2.3%), IUDs (1%) and Norplant® implants (<1%).

This method mix reflects a significant dependence on short-term methods and a low acceptance of LT/P methods such as the IUD and voluntary sterilization. Increasing the use of LT/P methods has been identified—by the MOH/CW, the Zimbabwe National Family Planning Council (ZNFPC) the United States Agency for International Development (USAID) and other donor agencies—as the primary FP need in Zimbabwe.

One of the most significant factors contributing to the low acceptance of LT/P contraception and to the general plateau in FP program achievement is the insufficient number of trained service providers who are competent to provide LT/P methods of contraception. Using other training approaches to complement the traditional group-based approach would increase the national training capacity and ensure that training is appropriate for each cadre of provider.

### ***The Zimbabwe National Family Planning Council***

The ZNFPC is a parastatal agency charged by the Zimbabwean government with coordinating all FP activities in the country including providing technical assistance to the MOH/CW and other organizations as necessary, and coordinating contraceptive logistics, training, evaluation information, education and communication activities and service delivery.

The ZNFPC conducts general FP training courses for its own clinic staff and community-based distribution workers, maternal and child health and FP trainers from the MOH/CW, nursing staff from the MOH/CW and the city councils (excluding Harare), and providers in employer-provided clinics. The ZNFPC also does all training in IUD insertion/removal and in counseling for voluntary sterilization. Almost all training is group-based (i.e., participants are brought from work sites to a designated location for a specific period of time for a training course). They are lodged in training centers or hotels, paid allowances for meals and incidental expenses, and reimbursed for transportation costs.

### ***Alternative Training Approaches for Zimbabwe***

In 1993, JHPIEGO assisted the ZNFPC in developing and conducting an integrated IUD and genital tract infection (GTI) group-based training course for supervisors and service providers. However, this group-based training approach still could not meet the urgent need for trained FP service providers.

In response to the ZNFPC's need for a variety of training approaches that would maximize its ability to train more service providers more quickly, JHPIEGO assisted the ZNFPC, MOH/CW, and city councils in developing an IUD/GTI on-the-job training (OJT) package at a materials development

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<sup>2</sup> This represents an increase of only 1% over the percentage of women using combined oral contraceptives in 1988.

workshop held in Harare in August 1995.<sup>3</sup> The OJT training package consists of an IUD/GTI reference manual, a supervisor guide, a trainer guide and a trainee workbook. Workshop participants suggested that ModCal be pilot tested at selected OJT pilot test sites.<sup>4</sup> After much discussion, workshop participants decided to pilot test each new training approach (OJT and ModCal) separately.

Following at least three years of discussion in Zimbabwe about using ModCal as an alternative training approach, JHPIEGO began collaboration with the ZNFPC “to formulate a pilot research study of the cost-effectiveness, acceptability and time efficiency of computer-assisted instruction for orientation of ZNFPC staff, provincial-level inservice training, midwifery preservice training and private practitioners.” (Husman 1993) By late 1995, all key stakeholders (MOH/CW, ZNFPC, JHPIEGO) interested in considering CAL as an alternative to group-based training in IUD/GTI recommended a pilot test of this approach in Bulawayo in both inservice and preservice settings.

## **PILOT TEST OF MODCAL**

The pilot test examined the feasibility of using ModCal in the preservice setting, determined the effectiveness of ModCal as a tool for knowledge transfer, and gathered pilot-based experience to determine how feasible and practical ModCal is for use in Zimbabwe. Participants were a group of midwifery students who had no prior computer experience. The pilot test assessed how these students responded to using the CAL approach to learn about providing IUD services.

### **Methodology for Assessing the ModCal Pilot Test**

The objectives of the pilot test were to:

- ◆ Document the process of implementing this new training approach (including the participant-computer interaction) with a group of Zimbabwean midwifery students
- ◆ Assess the feasibility of and potential for introducing ModCal into a preservice midwifery education setting
- ◆ Assess the feasibility of using CAL to transfer RH/FP-related information to a group of Zimbabwean midwifery students

The areas of interest for piloting the introduction of this new learning approach were *feasibility of implementation* and *knowledge acquisition*.<sup>5</sup>

- ◆ *Feasibility of implementation:* Feasibility questions focused on how CAL workstations could be installed and maintained in a developing country setting and what institutional support

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<sup>3</sup> For a detailed description of JHPIEGO's on-the-job training approach, see Sullivan RS and T Smith. 1996. *On-The-Job Training for Family Planning Service Providers*. Strategy Paper #3. JHPIEGO Corporation: Baltimore, Maryland.

<sup>4</sup> Replacing the IUD reference manual with the computer modules

<sup>5</sup> See **Appendix A: Objectives and Key Questions to be Answered**.

was needed to accomplish this. In this pilot test, additional questions specific to the feasibility and possibility of incorporating ModCal into training in Zimbabwe were explored—including an examination of the interface and hardware/software. The data collected were observational and empiric.

- ◆ *Knowledge acquisition:* Improvement in subject matter knowledge was demonstrated by comparing the pretest score to the post-test score.

### Data Collection Methods

A variety of qualitative and quantitative methods were used in the pilot test including: self-administered questionnaires, knowledge pre- and post-tests, in-depth interviews, and observations of participants using ModCal. **Table 1** summarizes the methods and objectives for each instrument. Sections following the table provide detailed explanations of each data collection instrument.<sup>6</sup>

**Table 1. Summary of Data Collection Instruments Developed for ModCal Pilot Test**

Name of Instrument	Method	Objective
<i>Participant Profile Questionnaire</i>	Self-administered questionnaire	To collect information on educational level, FP experience, and computer experience including background information on previous work history and familiarity and comfort level with computers
<i>Pre- and Post-test In-Depth Interview Guide: Tutors</i>	Interview	To determine tutors' opinions of CAL as a method for knowledge transfer and the perceived benefit of CAL in preservice training
<i>Observation</i>	Observation by CAL Specialist	To assess participants' ease with the computer, especially how comfortable participants were in using the mouse to answer on-screen questions and to navigate within the program
<i>Knowledge Pre- and Post-Tests</i>	Computer-based multiple-choice tests	To assess participants' knowledge of the subject matter prior to and after completing IMM modules
<i>Language Assessment Instrument</i>	One-on-one testing	To ensure participant's competency in understanding oral English
<i>Post-Test Reactions Interview Guide</i>	Interview	To document participants' reactions to specific modules, and their opinions on: the pace of presentation, their comfort and ease with the computer, and CAL's potential for use for midwifery training. And, to elicit specific comments and suggestions for improvement

<sup>6</sup> A full set of the data collection instruments are on file at JHPIEGO.

### ***Participant Profile Questionnaire***

Before beginning the ModCal program, participants were asked to complete a *Participant Profile Questionnaire*, which collected background information on previous work history, FP experience, and familiarity and comfort level with computers. Participants were able to fill out this paper-based questionnaire in approximately 5 to 10 minutes.

### ***Pre- and Post-Test Indepth Interview Guide: Tutors***

The Mpilo School of Midwifery tutors were interviewed by the CAL Specialist before they went through the modules for information on how much time they spend with students in class, clinical practice settings and in demonstrations of clinical skills. They were asked whether the allotted time periods are sufficient and whether they felt they could use more. Finally, their impressions of CAL and its perceived benefit or limitations in the preservice setting were recorded.

After completing the modules and watching their students and colleagues participate in the pilot test, the tutors were interviewed again. They were asked the same questions about content, pace, comments and suggestions as the other participants. In addition, their impressions on ModCal's perceived benefits and limitations after experiencing the program were recorded.

### ***Observation***

The CAL Specialist monitored the participants' activity by watching them work through the modules and then recording the observations on a checklist and in a notebook. Observations focused on the participants' ease with the computer, how easily they interacted with the interface (on-screen buttons and their use) and the hardware (clicking with the mouse), and any difficulties or problems they encountered.

### ***Knowledge Pre- and Post-Tests***

After completing the module, *Welcome to ModCal*, each participant took a baseline knowledge test on the computer, which consisted of multiple-choice questions related to the subject matter presented in the modules: *Introduction to IUDs*, *Counseling*, *Client Assessment*, *Infection Prevention*, and *HIV/AIDS*. After participants completed the pretest, they were informed of the percentage of questions they answered correctly. At the end of the ModCal training session, participants took a multiple-choice knowledge post-test.<sup>7</sup> After they completed the post-test, participants were shown both their pre- and post-test scores, by module, so that they could compare their performance.<sup>8</sup>

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<sup>7</sup> The pre- and post-test questions were rearranged, but the distractors were the same. This testing approach is similar to that used in JHPIEGO's group-based training approach.

<sup>8</sup> Item validity was established by basing items on the key concepts.

## ***Language Assessment Instrument***

The ModCal module format is audiovisual; therefore, knowledge transfer depends upon the participant's aural and visual language proficiency. The participant views a screen containing text along with graphics, photographs, animation or video clips, and then listens to a brief explanation of the information. Because English may not be the primary language for all participants, there was concern that participants might have difficulties comprehending what they were hearing.

A language assessment instrument, the Language Assessment Scales<sup>®</sup>, was administered to each participant to assess his/her comprehension of oral English.<sup>9</sup> This test was important because it could determine whether the student's ability to understand oral English was a factor in his/her understanding of ModCal content.<sup>10</sup>

### ***Post-Test Reactions Interview Guide: Participants***

After participants had completed the modules and the post-test, interviews were conducted to compare participants' post-training session reactions to their initial expectations. Questions examined which modules the participants liked and disliked, which modules were the most informative, what participants thought about the pace of presentation, and participants' comfort and ease with the computer. Participants were also asked their opinions about: ModCal as a tool for knowledge transfer, the role of facilitators, and the perceived benefit of CAL in preservice training.

### **Planning and Implementing the ModCal Pilot Test**

The pilot test was a collaborative effort between in-country counterparts and JHPIEGO. Within JHPIEGO, the East and Southern Africa regional office (RO) coordinated all activities, the Information Technology Office (ITO) developed ModCal, and the Research and Evaluation Office (REO) supported the pilot test. **Table 2** outlines the sequence of activities for planning and implementing the pilot test.

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<sup>9</sup> See **Appendix B** for a detailed description of the Language Assessment Scales<sup>®</sup>.

<sup>10</sup> A language assessment would not usually need to be administered as part of a ModCal implementation in a non-pilot test setting.

**Table 2. Pilot Test Activity Sequence**

<b>Months</b>	<b>Activity</b>	<b>Facilitator</b>
Jan 93–Dec 95	<b><i>Consensus Building</i></b>	ICC, RO
	<b><i>Planning</i></b>	
March 95–Jan 96	Module finalization: Regional office determines if localization (e.g., changes to language, images, content) is necessary and essential and if so, ITO modifies modules with RO guidance.	RO, ITO
Aug–Dec 1995	Pilot test site selection	ICC, RO
Dec 1995	Needs assessment of site (training resources and physical resources)	RO or ITO
March–April 1996	Development of pilot test plan and data collection instruments	ICC, RO, ITO, REO
March–May 1996	Finalization of pilot test dates and plans	ICC, RO, ITO, REO
February 1996	<b><i>National-level orientation</i></b>	ICC, RO
May 1996	<b><i>Institutional orientation at pilot site (Bulawayo)</i></b>	RO, ITO
May–June 1996	<b><i>Pilot test</i></b>	ITO

Key: ICC = In-country counterparts; RO = JHPIEGO Regional Office; ITO = JHPIEGO Information Technology Office, REO = JHPIEGO Research and Evaluation Office

### **Consensus Building and National and Institutional Orientations**

In 1993, initial discussions were held about the potential for CAL in Zimbabwe. The subsequent process of meeting with all key stakeholders to build consensus and to determine the student/provider populations for whom this learning approach would be effective in Zimbabwe took approximately four years. Beginning in 1995, JHPIEGO staff and consultants met with ZNFPC, MOH/CW, USAID and other stakeholders on each trip to Zimbabwe to discuss the appropriate setting for testing the CAL modules. The technology itself was demonstrated for various levels of staff (from local tutors to national directors) during the pilot test visit.

As the organization responsible for coordinating all FP activities in the country and for heading up new RH/FP initiatives, the ZNFPC was key to the consensus-building process. Even though a ZNFPC clinic site was not selected for the pilot test, ZNFPC representatives were closely involved in all planning. And, because they would continue to play a substantial role in an eventual ModCal roll-out, the ZNFPC planned to contribute a trainer who had previous IUD training experience to assist with the pilot test.

After consensus had been built at the national level, discussions continued at the local level (pilot test site) just prior to the actual pilot test. The Deputy Director of Nursing Education, MOH/CW and the Assistant Director of the Training Unit at the ZNFPC accompanied JHPIEGO staff to the site of the pilot test, Mpilo School of Midwifery, to provide support for the pilot test and to ensure that



all appropriate personnel in Mpilo (including provincial and hospital staff) were oriented. At a series of meetings, the CAL Specialist and Project Development Officer (PDO) demonstrated the technology and provided information regarding the logistics of the pilot test. During the implementation, JHPIEGO staff met with tutors and preceptors at Mpilo to document their impressions of this new technology as a learning approach and also to determine ways in which CAL could be integrated into a preservice setting.

## **Planning for the Pilot Test**

### ***Module Finalization***

Approximately a year prior to implementation of the pilot test, ITO sent a questionnaire on participant characteristics to the ZNFPC. This document included questions on the following topics: gender, language (literacy level, what language most comfortable for learning) role models, professional level, existing knowledge of the subject matter, religion, working environment (what clinics look like, what equipment/materials are used) and cultural environment (prevailing attitudes about contraception). ITO used information from the questionnaire to ensure that the modules being developed were appropriate for Zimbabwe.

The CAL modules used in this pilot test were based in large part on the ZNFPC IUD/GTI reference manual.<sup>11</sup> Because photos could not be easily obtained from Zimbabwe, ITO worked with Zimbabweans living in the Baltimore/Washington area to stage counseling sessions with images that would be culturally familiar. These sessions were videotaped for use in the modules (as both video clips and still photos) and Zimbabwean music was incorporated where appropriate.

### ***Site Selection***

When the Principal Tutor from Mpilo School of Midwifery in Bulawayo participated in the OJT materials development workshop in August 1995, she indicated that the school would be interested in taking part in a CAL pilot test—apart from the OJT pilot test. Because the preservice setting would be desirable for the full ModCal approach, USAID/Zimbabwe, JHPIEGO, MOH/CW and ZNFPC agreed to test the CAL modules at the school.

### ***Site Needs Assessment***

Several months before the pilot test began, a needs assessment was conducted. Its scope included a review of the training situation at the Mpilo School of Midwifery along with an assessment of the physical resources at the school and in Bulawayo to support the computer hardware and software needs.<sup>12</sup> The needs assessment showed that the institution was ready to give organizational support and commitment to the ModCal pilot test. The key findings were:

- ◆ *Midwifery students learn about all FP methods but do not actually learn how to do IUD insertions/removals.* Discussions with national-level representatives centered around IUD instruction for midwives, specifically the content and timing of classroom instruction where

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<sup>11</sup> Adapted from the JHPIEGO IUD reference manual in October 1993.

<sup>12</sup> See **Appendix C** for a summary of the needs assessment findings.



CAL modules would substitute for a lecture. The syllabus for the FP curriculum and the MOH/CW standards for midwifery student FP clinical practice were reviewed.

- ◆ *The facility and other support were appropriate and adequate.* The appropriateness of the site was assessed during a December 1995 visit to the Mpilo School of Midwifery. Using a questionnaire provided by the IT office, JHPIEGO staff examined the physical structure of the school and the room to be used for computer training, specifying location of electrical outlets and windows. In addition, a list of computer companies in Bulawayo was compiled in the event that outside technical assistance during the pilot test became necessary.

### ***Finalization of Plans***

JHPIEGO staff met with the Principal Tutor and clinical instructors at the Mpilo School during the visit in December 1995 to review implementation of the midwifery curriculum for RH/FP training and faculty's previous RH/FP training background. Following this visit, continued communication between JHPIEGO, the Principal Tutor, and the ZNFPC Senior Tutor at Bulawayo clarified other logistical and implementation issues. The ZNFPC Senior Tutor was selected by the ZNFPC as the resource person because of her years of experience as an Advanced Trainer for IUD as well as her orientation to ModCal during a September 1995 visit to JHPIEGO's Baltimore office.

### **Implementation of the Pilot Test**

In May 1996, just before the pilot test began, the CAL Specialist and the Zimbabwe PDO met in Harare with the Assistant Director of the Training Unit for the ZNFPC and the Deputy Director of Nursing Education for the MOH/CW to review the objectives and implementation plan for the pilot test and to demonstrate the ModCal prototype modules. Both the Assistant Director and Deputy Director accompanied the CAL Specialist and the Zimbabwe PDO to Bulawayo for the first day of the pilot test. The two Zimbabwe officials supported this activity by introducing the CAL Specialist to their colleagues in Bulawayo and assisting the CAL Specialist with demonstrating the ModCal technology to key personnel. The Principal Tutor, Mpilo School of Midwifery, and the Coordinator of FP Services at Mpilo Maternity Hospital coordinated the pilot test. In addition, the Principal Tutor arranged a ModCal demonstration—which was conducted by the CAL Specialist—for groups of students, so they could decide if they were interested in participating.

### ***Participant Selection***

Originally the pilot test was designed so that midwifery students from three intakes (January, May and September) could complete the ModCal program. These students' ModCal pre/post-test scores could be compared with their experience in a group-based training program (i.e., the amount of time they had spent in the classroom and their clinical experience.) Student participation in the pilot test was completely voluntary. No extra course credit or incentives were given. Upon discussions with the Principal Tutor, it became clear that it would be difficult to obtain adequate samples from the three intakes. The May group of students would be in examinations during the pilot test period, and the students from the September and January groups were in clinics throughout the city. It was decided instead that students from any intake could participate based on their interest and availability; however, this limited the expected numbers from each intake.

On review, the coordinators decided to open the pilot test to a wider range of nurses rather than focusing only on midwifery students. Because the midwifery program is a course entered into by

practicing nurses (i.e., 2 or more years of practice after basic nursing training), it was decided that nurses from the Mpilo Maternity Hospital should be able to participate in the pilot test if interested. Since the sample of midwifery students was not a true “preservice” group (because they were all practicing nurses), the participation of both practicing nurses and midwifery students reflected a homogeneous group of nurses.

Information about the pilot test was disseminated throughout the Mpilo hospital system, and the ModCal Specialist conducted two demonstrations—each for approximately 15 participants. Participants were asked to sign up in 1-hour blocks of time, from 9:00 am–6:00 pm. Time required to complete the modules and pre- and post-tests was estimated to be about 5 hours. Most people signed up for at least 2 hours on the first day.

### **Hardware Installation**

Four multimedia laptops with swapout floppy and CD-ROM drives were set up, each as a workstation, in the school’s demonstration room. (This room also doubles as the kitchen and break room for students and staff).<sup>13</sup> The laptops were placed on individual tables or desks and connected to earphones for privacy.

### **Software Set-up**

After completing a paper-based *Participant Profile* questionnaire, each pilot test participant proceeded to a laptop to begin work on the IMM modules. The first screen participants encountered was “Welcome to ModCal.” From this screen, they were asked to select one of two buttons: *New User* or *Current User* (**Figure 1**).<sup>14</sup>

**Figure 1**



Because this was the first time any of the participants had used a computer, each participant had to be guided by the facilitators to click on the “new user” button with the mouse. The computer led

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<sup>13</sup> The laptops were removed from the school every night and brought back in the morning.

<sup>14</sup> This is the first screen they see every time they use ModCal.

participants through an introductory module that explained computer basics, (i.e., how to use the computer, mouse skills, and essential information about the features of ModCal including buttons and navigation).

Following the introductory module, the participant took the knowledge pretest which consisted of 35 multiple-choice questions based on the content to be presented in the modules.<sup>15</sup> Participants selected one answer per question and clicked on a "continue" button to move to the next question. They were not allowed to review or change their answers once selected. At the end of the test, participants were shown their score (percentage of correctly answered questions) and asked if they wanted to proceed immediately to the content modules.

Next, participants could begin by choosing any of the five modules from a map of the abridged course which displayed all five IUD modules to be completed. Upon completion all five modules, participants were presented with a post-test. This test consisted of 35 multiple-choice questions that were similar, but not identical, to those on the pretest. Participants were allowed to review and change their answers until they were satisfied with all of their choices. The computer software then tabulated the score and showed them a table comparing their overall scores and section scores on the pre- and post-tests (Figure 2).

**Figure 2**

Module	Total # Questions	Pretest # Questions Correct	Post-test # Questions Correct
Introduction to IUDs	10	5	8
Counseling	5	3	5
Client Assessment	5	4	5
Infection Prevention	10	7	9
HIV/AIDS	5	2	4

Finally, once all the modules and tests were completed, participants met individually with the CAL Specialist for the *Post-Test Reactions Interview* and were given the standardized oral comprehension test, Language Assessment Scales®.

## FINDINGS

Thirty-eight nurses participated in the pilot test; 13 were currently midwifery students, the majority (9) from the January 1996 intake. Of the 25 practicing nurses, most were working as Sister-in-Charge, Senior Sister, or Clinical Instructor, and most were from Mpilo Hospital Maternity Ward.

<sup>15</sup> 10 on *Introduction to IUDs*, 5 on *Counseling*, 5 on *Client Assessment*, 10 on *Infection Prevention*, 5 on *HIV/AIDS*

The participants came from a variety of settings, including different wards within Mpilo Hospital and from other community facilities outside the hospital.<sup>16</sup>

Participants had an average of 12.7 years of work experience (ranging from 3 to 27 years) and 4.6 years of formal education beyond secondary school. Only 2 nurses had previous IUD insertion experience, although about three-quarters had previous experience with oral pill or condom provision.

None of the participants had ever used a computer before and only one participant had a computer at home. Nearly 40% (15/38) stated that a family member used a computer routinely, but only 6 reported that someone in their family owned a computer.

### **Feasibility of Implementation**

Feasibility of implementation covers a wide range of topics—including hardware and software installation and incorporating ModCal into training in Zimbabwe. The CAL workstations were installed and the pilot test conducted without any problems. No additional computer support was required from an outside agency at any point during the pilot test. The ModCal software ran well with only minor technical difficulties. In addition, everyone involved in the pilot test was enthusiastic about ModCal and its potential for use in preservice training. Participant interest and further considerations for introducing ModCal into preservice settings are discussed in detail in the **Discussion** section.

### **Computer Use**

Prior computer use was not a factor in learning the content or in being able to maneuver through the program. Participants were able to learn how to use the pointing device very rapidly and to move straight into the IUD information, the program's primary focus.

Throughout the ModCal training session, participants' attention appeared to be focused on the screen.<sup>17</sup> Most of the time, they kept their hands on the mouse, anticipating a question or the need to navigate through the program by pausing, reversing or going to the text level. Many took notes and asked the facilitator additional questions about the content. They remarked that they enjoyed answering the questions in the periodic computer progress reviews.

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<sup>16</sup> Interest among practicing nurses was so great, that—due to time constraints— some of these nurses had to be turned away.

<sup>17</sup> Among participants' initial reactions to the computer were surprise at how small the laptop was and nervousness about breaking the machine. Once reassured that they could not erase any files or do any damage with regular use, the participants were much more at ease.



### **Interactive Module Navigation**

Before beginning each IUD module the participant was presented with a map of the abridged course that displayed the five IUD modules for selection. As shown below in **Table 3**, 63% (24/38) chose to start with the first module; however, only 10 participants completed the modules in sequence; and 21 participants varied the order in which they completed the modules.<sup>18</sup>

**Table 3. Initial Module Selection**

<b>Module</b>	<b>Number Selecting</b>
Introduction to IUDs	24
Counseling	4
Client Assessment	1
Infection Prevention	5
HIV/AIDS	4

During interviews, participants praised the program's self-paced aspect—largely because they felt that they controlled the direction and pace of the learning and could pause or review sections or modules at any time.

### **Knowledge Assessment**

Pretest scores ranged from 34 to 74% and post-test scores from 54 to 97% with means of 54% and 78% respectively (**Figure 3**).<sup>19</sup> The increase of 24% from pre- to post-test is significant ( $t = 13.9$ ,  $p < 0.0001$ ).<sup>20</sup>

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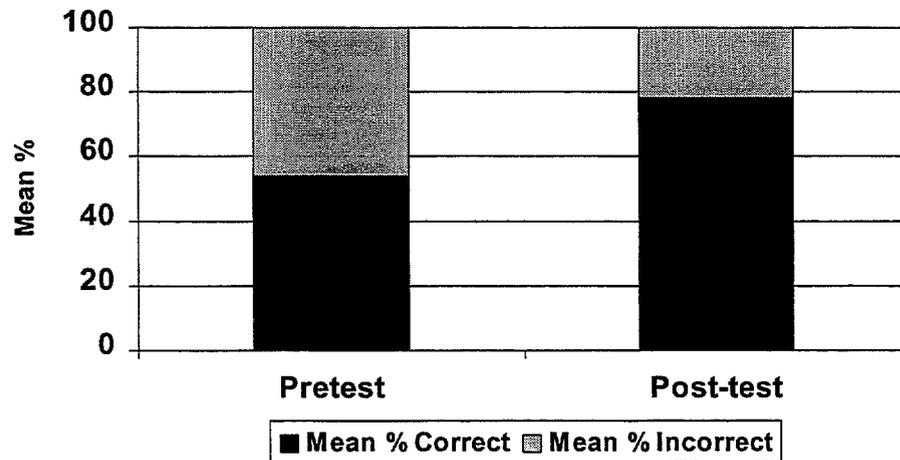
<sup>18</sup> No data available for 7 participants.

<sup>19</sup> See **Appendix D** for a detailed discussion of the post-test item analysis.

<sup>20</sup> As would be expected (and discussed previously) because midwifery students had a minimum of 2 years of practice after basic nursing training, no significant difference in test scores was exhibited between the "midwifery student" and "practicing nurse" groups.

**Figure 3**

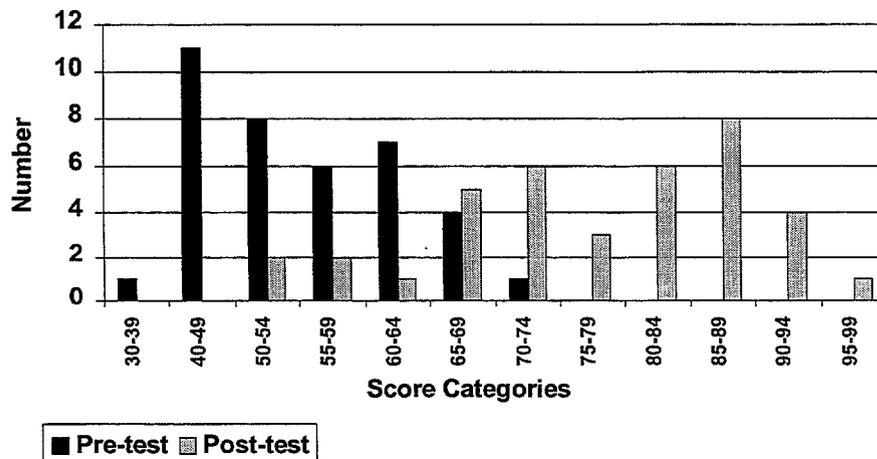
### Pre- and Post-test Group Mean Scores



**Figure 4** shows the range of scores by pre- and post-test. Using a score of 85% (the passing score for the knowledge component of ZNFPC's IUD certification process for service providers in Zimbabwe), 13 nurses scored 85% or better on the post-test. It should be noted, however, that 65% is the passing score for those service providers who take ZNFPC's Basic Clinical FP Course and the passing score for the graduation exam for nursing/midwifery school is 50%.

**Figure 4**

### Comparison of Pre- and Post-test Knowledge Scores



## Participant Reactions

### Content

Thirty-six participants were interviewed individually about the CAL program, and their comments and suggestions for improvement were recorded. The two modules ranked as most interesting and containing the greatest amount of useful information were *Introduction to IUDs* (44% or 16/36) and *Infection Prevention* (31% or 11/36). *Introduction to IUDs* was most likely selected because, of 36 participants, only 2 had prior experience with IUD provision. Although infection prevention was a topic that both the practicing nurses and the midwifery students were already familiar with, many of them indicated that they had learned new information from the CAL sessions about the *reason* for specific practices along with *new techniques* for preventing infection. The *HIV/AIDS* module was often noted as the least interesting module (39% or 14/36). Because discussion, information dissemination and education about the disease in Zimbabwe have been plentiful, most of the nurses and midwifery students felt they were already well informed about the topic.

When asked to describe ModCal's best feature, most participants discussed the self-paced aspect of the program—which allowed them to pause to take notes, review sections as many times as they liked, read from the text section, and answer every question. Participants felt in control of their learning and could obtain information in the way it most helped them.

The following quotations are specific comments from midwifery student interviews:

- ◆ "I liked the program because if you don't understand, you can replay, or if it's going too fast, you can pause it. A tutor may just rush through. The voices were audible and the language was clear."
- ◆ "If information has not been grasped, the participant can always replay and this enhances understanding. Teachers can create an environment that is not conducive to learning. Students may be afraid of the teacher and of admitting that they are still not clear, so they keep quiet and ask friends because they fear their classmates may make fun of them or teacher may ridicule them by saying 'Where were you?'"
- ◆ "You hear the person talking and you look at the screen and with a quick glance, you can get the point (there is not too much information to absorb at one time)."
- ◆ "There is regular, formative evaluation to assess understanding (progress reviews)."<sup>21</sup>

### Potential in Preservice Training

After the Mpilo School of Midwifery tutors completed the program, they were interviewed about the potential role for ModCal in a preservice setting. Before trying the program, the tutors had expressed (informally) some concern about computers replacing teachers; however, after going through the program themselves and watching their students use it, the tutors became enthusiastic

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<sup>21</sup> This person liked the immediate feedback and explanation of what the correct answer should have been when the participant selected a wrong answer.



about the possibilities for CAL, as shown in their comments below. They felt the primary benefit would be providing students with standard information from the computer, freeing up the tutors to work more closely with students on role plays, demonstrations and practice with models, and allowing more time for individual questions. Tutors' comments are categorized below.

*Self-directed learning* "It [CAL] makes individuals independent and responsible for their own learning. They are self-directed and they prioritize the modules for themselves."

*Helpful for students* "It [CAL] will cater to students of different abilities in following a lesson. They can go at their own pace. It's good for revision purposes too, if you can't find a test group, it would be better than reading on your own."

*More efficient for tutors* "Students can prepare on their own. It [CAL] will help consolidate what the students have learned."

### **Interface**

Observations along with information from the interviews prompted a list of recommendations for improving the interface and the features including: screen color, navigational buttons, and amount of audio that can be reviewed.<sup>22</sup>

### **Language Assessment**

To ensure that the language level used in the ModCal modules was appropriate, a language assessment was administered to 36 participants.<sup>23</sup> **Table 4** shows the mean and standard deviation for all three subscales. The table also presents the mean and standard deviation for a sample population for comparative purposes.<sup>24</sup>

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<sup>22</sup> See **Appendix E** for details of the Interface Changes.

<sup>23</sup> The test uses audiotape and an image book. Participants listen to the tape and answer questions. The voice on the tape is American as is the narrator of ModCal.

<sup>24</sup> The sample data (provided by the test developer) were analyzed according to level of oral proficiency as indicated by school personnel or records. Two primary groups were formed from the population: fluent speakers and limited speakers.

Table 4. LAS-O English Scores for Zimbabwe Subjects and a Comparative Population

	Zimbabwe Subjects		Sample Population					
			Total Population Comparative Group		Limited Speakers Comparative Group		Fluent Speakers Comparative Group	
Subscale	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd
Vocabulary	18.19	1.45	17.71	4.26	13.18	4.46	18.69	1.45
Listening	8.78	1.06	8.75	1.34	8.18	1.55	9.27	0.92
Minimal Pairs	26.83	4.36	26.51	4.40	26.07	5.20	30.27	2.15

*Zimbabwean subjects* scored slightly above the mean for the sample population and were closer to the *fluent speakers* than the *limited speakers*. Based on these data, the Zimbabwe participants experienced few difficulties in understanding the English presented in the ModCal modules.<sup>25</sup> While the Zimbabwe participants are fluent English speakers, the difference between British and American English may account for the fact that they fall close to the middle—between limited and fluent—on listening, and closer to limited on minimal pairs.

## DISCUSSION

The implementation of ModCal within a developing country setting went smoothly, and knowledge transfer did occur. Based on observations of computer novices using the program along with experiences in developing the ModCal program at JHPIEGO, a redesigned and more user-friendly interface was developed. The additional modules to complete the ModCal IUD package are now being finalized.

Several activities were essential to the success of this activity. Initially, **consensus building** over several pilot visits ensured "ownership" and provided the needed support from and collaboration with MOH/CW, ZNFPC and others including USAID. In addition, the **needs assessment** ensured that the Mpilo School of Midwifery in Bulawayo, Zimbabwe, was an appropriate setting for this pilot test. Throughout the activity, a **clear definition of counterpart roles** facilitated the effective transfer of ModCal technology from one country to another. And finally, identifying a strong in-country counterpart—one who could work initially with the CAL Specialist and later provide long-term management for this new initiative in Zimbabwe—was critical to the implementation and continuity of ModCal pilot testing in East and Southern Africa.

For student midwives and practicing nurses in Zimbabwe, CAL was clearly a novel way to learn information. And the computer was so attractive as a learning medium that it generated interest in the pilot test throughout the Mpilo hospital system. In fact, interest in CAL was so great that some potential participants had to be turned away so that everyone who had begun the program would have enough time and access to the computer to complete the program.

<sup>25</sup> Statistical analysis showed no correlation between vocabulary score and a participant's post-test score (Spearman's rho = 0.10 (ns) for 35 learners).

This overwhelming interest in a new technology raises the following question: *To what extent was the successful transfer of information due to CAL's novelty as a means for presenting information and to the computer's attractiveness?* On one hand, the computer was a motivating factor. Many participants commented that they would have liked to learn about computers in general (i.e., how they work and how to use them). The fact that participants signed up for slots before and after their nursing shifts, during tea and lunch breaks, and on classroom breaks, could reflect a strong interest in becoming more familiar with computers. But, because participants in the pilot test were asked to commit to approximately 5 hours (or the amount of time it would take them to complete the program), it seems that access to the IUD knowledge update was an equally motivating factor.

Questions regarding the introduction of ModCal into the preservice setting still need to be answered in the following areas:

- Curriculum:* How can ModCal be integrated into existing preservice training curricula in Zimbabwe to include the clinical skills training sectors?
- Trainer:* Who will facilitate the use of ModCal in a training institution? How can these duties be integrated into that person's current job responsibilities? What training would be required to prepare a facilitator?
- Clinical practice:* What links need to be established between CAL and the clinical practice setting?
- Institutional setting:* Are there criteria that could determine whether midwifery schools are suitable as settings where ModCal could be successfully incorporated as a complementary training approach?
- Computer support:* Who, within an institution, can support computer use? In countries where computer access is fairly new, will computer cost and management be best supported—at least initially—by development agencies? Will the person who facilitates computer training also maintain and support computer use—or will an additional computer support person be needed?

## RECOMMENDATIONS

- ◆ **Pilot test ModCal in a competency-based training event:** The feasibility of implementing ModCal has been demonstrated, but ModCal IUD stills need to be pilot tested in a situation where it can be integrated with clinical skills training (both model- and client-based). Opportunities for this type of pilot test may be available in the near future as part of structured OJT programs in Zimbabwe and Kenya, and in preservice/in-service nursing programs in the Philippines.
- ◆ **Determine appropriate scenarios for ModCal in in-service and preservice training settings:** ModCal is only one of a variety of training approaches that will support national RH/FP training programs. JHPIEGO should continue to examine and determine the most appropriate mix of training approaches for national country programs or for a particular FP method or provider population.

- ◆ **Allow adequate lead time for implementing ModCal:** When planning ModCal implementation, at least three months should be allowed to localize ModCal (i.e., adapt ModCal as needed, to the local setting) along with a minimum of one year to build consensus for its use.
- ◆ **Adapt the generic ModCal IUD package only when absolutely necessary:** Localization is expensive and time-consuming. The generic ModCal IUD package will be appropriate for many country situations. JHPIEGO's experience with an IUD prototype course—that uses multicultural photos and images from around the world, and narration and text in English—has shown that a generic prototype is appropriate for most settings.<sup>26</sup>

## CONCLUSION

This successful pilot test helps alleviate doubts about the applicability of CAL in the African setting. Key people from a variety of organizations—including Ministry of Health senior managers, donors, and representatives from implementing organizations—acknowledged that this pilot test succeeded in implementing CAL and in demonstrating that knowledge can be transferred using the CAL approach. Everyone involved in the Zimbabwe pilot test believes that ModCal is a useful tool for transferring knowledge during RH/FP training in Zimbabwe.

ModCal is an appealing new training approach. By using computer technology to maximize training efficiency, trainers can redirect their time—which is scarce—to areas that depend upon intensive trainer-learner interaction. ModCal uses the computer to enable participants to absorb new knowledge at their own pace so that more trainer time is available for skills practice. In a relatively sophisticated country like Zimbabwe, the potential for institutionalizing ModCal is great.

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<sup>26</sup> In some countries, it may be necessary to replace some images with ones that reflect the people of that nation, or the narration and text may need to be translated and rerecorded.

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# APPENDIX A

## Objectives and Key Questions to Be Answered

**Overall Objectives:**

- ◆ Document the process of implementing this new training approach (including the participant-computer interaction) in a group of Zimbabwean midwifery students
- ◆ Assess the feasibility of and potential for introducing ModCal into a preservice midwifery education setting
- ◆ Assess the feasibility of using CAL for the transfer of RH/FP-related information to a group of Zimbabwean midwifery students

QUESTIONS TO BE ADDRESSED	DATA COLLECTION METHOD
<b>1. INSTALLATION OF EQUIPMENT AND RELATED ASPECTS</b> <b>How much computer support is needed for installation and ongoing implementation and what configuration of resources should support this?</b>	
<i>Who will take care of computers at the school and what support do they need?<sup>1</sup></i>	<ul style="list-style-type: none"> <li>• Observations, interviews, technical record of support calls</li> </ul>
Are there power supply problems at the school?  Which are optimal—laptops or desktop work stations, and what are the criteria for determining use of one type over the other?  What is the ideal number of students per computer?  What is the best way to schedule computer time?	<ul style="list-style-type: none"> <li>• Structured/unstructured observation by CAL Specialist reported in CAL Specialist Zimbabwe Trip Report</li> </ul>
<i>What preparation is needed for the in-country technical support/resource person to provide quality assistance during implementation? What problems arose that could have been prevented/minimized with additional preparation during the installation?</i>	<ul style="list-style-type: none"> <li>• Observations and documentation of technical assistance requests documented in Report of Pilot Test</li> </ul>
<b>2. IMPLEMENTATION</b> <b>What effect will implementation of ModCal have on the way tutors presently teach and on the ability of students to learn?</b>	
<b>Tutors:</b> What is the role of the tutor in implementing ModCal? Are tutors willing to facilitate the CAL portion of the approach? What is tutors' level of computer knowledge/experience? What do tutors know about ModCal? How well do the Technical Guidelines work?  What is tutors' level of IUD knowledge? How do tutors usually teach the RH/FP information? How do the tutors feel about using CAL as a learning tool for RH/FP?	<ul style="list-style-type: none"> <li>• Pretest In-Depth Interview Guide: Tutors</li> <li>• Post-Test Reactions Questionnaire/Interview: Tutors</li> </ul>

<sup>1</sup> Italics in table are questions that could not be answered during this pilot test.

QUESTIONS TO BE ADDRESSED	DATA COLLECTION METHOD
<b>Participants:</b> How long do participants take to complete each module? The entire unit? What learning paths do participants use?	<ul style="list-style-type: none"> <li>• Structured observation by CAL Specialist</li> </ul>
<b>Participants:</b> How do participants react to the computer? The software? How do the participants feel about learning in this manner? Are they comfortable with changing the learning structure and routine? How well do the Technical Guidelines work?	<ul style="list-style-type: none"> <li>• Post-Test Reactions Questionnaire: Participant</li> <li>• Observation</li> </ul>
<b>Participants:</b> What are some of the participants' most frequently-asked questions regarding (1) the computer, (2) screens, (3) IUD, etc.?	<ul style="list-style-type: none"> <li>• Documentation of questions formalized in a document listing frequently asked questions and answers</li> </ul>
<b>3. KNOWLEDGE TRANSFER:</b> <b>What factors facilitate and hinder the effectiveness of ModCal in knowledge transfer?</b>	
Does the midwifery student's knowledge level regarding the IUD, IP, counseling, client assessment, and HIV/AIDS increase after completing the CAL modules?	<ul style="list-style-type: none"> <li>• Computer-based records of participant progress and tracking</li> <li>• Pre-/Post-test scores</li> </ul>
What factors affect the participant's performance on the pre- and post-tests?	<ul style="list-style-type: none"> <li>• Participant profile questionnaire</li> </ul>
<p>How do prior work experience and other characteristics affect participant performance on pre- and post-tests?</p> <p>How does prior computer exposure/use affect (1) how well participants do on pre- and post-tests and (2) how quickly they complete the modules?</p>	<ul style="list-style-type: none"> <li>• Computer-based records of participant progress and tracking</li> <li>• Pre-/Post-test scores</li> <li>• Participant profile questionnaire</li> </ul>
<b>4. ENSURING CLINICAL COMPONENT (AT ALL SCHOOLS):</b> <b>What mechanisms need to be strengthened or established so that ModCal can be implemented in a preservice training (PST) setting?</b>	
<i>Since this pilot test addresses only the CAL part of the approach, how would the midwifery schools design/implement the clinical practicum to complement the classroom CAL?</i>	<ul style="list-style-type: none"> <li>• Preliminary/ongoing discussions and interviews w/MOH/CW, ZNFPC and future visits (documented in PDO and ESA's Zimbabwe Trip Report) and in Report of Pilot Test</li> </ul>
<p><i>How do participants, tutors and administrative staff feel about the prospect of CAL taking place at clinical sites?</i></p> <p>What links need to be established between CAL and the clinical practicum? How/when will students gain clinical skills during/in addition to classroom training?</p>	<ul style="list-style-type: none"> <li>• Post-Test Reactions Questionnaire/Interview: Tutor</li> </ul>

QUESTIONS TO BE ADDRESSED	DATA COLLECTION METHOD
<b>5. CURRICULUM INTEGRATION-POLICY: How can ModCal be integrated into existing PST curricula in Zimbabwe?</b>	
<p><i>Is the MOH/CW willing to have the FP component of its midwifery curriculum converted into computer modules? How willing is the MOH/CW to change the curriculum to accommodate the time required to complete ModCal?</i></p> <p>Does the MOH/CW feel that computer-learning is an acceptable method for training midwifery students?</p> <p>Could some midwifery schools implement computer-learning while others continue to use the traditional teaching approach, or would all schools need to transmit information in the same way? What criteria will determine whether midwifery schools are suitable as settings where ModCal can be incorporated as a complementary training approach.</p> <p>How do the various stakeholders (USAID, ZNFPC, MOH/CW) feel about devoting resources to CAL?</p> <p>What would the ZNFPC envision as its role if ModCal were to be implemented on a wider scale in midwifery schools?</p>	<ul style="list-style-type: none"> <li>• Preliminary/ongoing discussions and interviews w/MOH/CW, ZNFPC and future visits (documented in PDO Zimbabwe Trip Report)</li> </ul>
<p><i>Who will facilitate the use of ModCal in a training institution? How can these duties be integrated into that person's current job responsibilities?</i></p>	<ul style="list-style-type: none"> <li>• <i>Post-Test Reactions Questionnaire/Interview: Tutors</i></li> </ul>
<p><i>How closely should ModCal replicate what is done in the usual classroom setting (i.e., intersperse didactic with role plays, watching demos and doing return demos, etc.?)</i></p>	<ul style="list-style-type: none"> <li>• <i>Literature review combined with JHPIEGO experiences</i></li> </ul>

## APPENDIX B

### Language Assessment Scales

The Language Assessment Scales (LAS)<sup>1</sup> is a battery of valid and reliable tests used to assess language proficiency in English. This test is administered orally and includes sections on vocabulary, listening comprehension and minimal sound pairs. The LAS-O English is intended for use as a screening device to produce placement and reclassification information for language-minority students (i.e., students for which English is not their primary language). It identifies a range of proficiency from most limited to proficient. In this pilot test of the ModCal system, three subscales of the LAS-O English were administered. These included:

- ◆ **Vocabulary** which contains two sections, *action words* and *opposite words*. A low score on this part of the test would indicate lack of sufficient exposure to oral English vocabulary and/or usage, either of which would predict difficulty in oral classroom interactions as well as in reading and writing.
- ◆ **Listening comprehension** which contains one dialogue and a series of yes-no questions. A low score on this subscale would indicate difficulty in understanding classroom lectures and discussions.
- ◆ **Minimal sound pairs** which tests auditory discrimination of minimal-pair items. A low score on this subscale is an indication that the participant may have difficulty understanding (decoding) words and sentences in instructional and other conversations.

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<sup>1</sup> Language Assessment Scales®, MacMillan McGraw-Hill



# APPENDIX C

## Needs Assessment Findings

### Mpilo School of Midwifery

### Bulawayo, Zimbabwe

#### Participant Profile

Before starting the 1-year midwifery program, each midwifery student has had three years of basic nurse training followed by at least two years of experience in the government (to reimburse the cost of training). The Mpilo School of Midwifery has three intakes per year (January, May and September), with 20 students per intake. English is the language used for teaching. Students have minimal computer skills.

#### Assessment of Existing Reproductive Health Curriculum

The nursing and midwifery schools have integrated the ZNFPC basic FP clinical course into their curricula (i.e., the IUD portion of ZNFPC basic FP clinical course is in the midwifery school curriculum). The FP content is included in the first classroom block and is covered over a 2-week period, with part of one day devoted to IUD theory. Midwifery students learn about all FP methods but do not actually learn to do IUD insertions. They have some anatomical models for learning perinatal care skills but do not have a Zoe® or other pelvic model. The tutors use handheld IUD models to demonstrate IUD insertion. Only the Principal Tutor had been trained in IUD/GTI.

The outline/syllabus/lesson plan for the FP curriculum content was sparse, making it difficult to determine the content and adequacy. The School, however, adheres to the following national standards for FP clinical practice:

- ◆ Examine 10 women (including a pelvic exam) and prescribe the appropriate FP method. Student midwives cannot supply the method but must refer the women to 1 of the 2 FP nurses at the Postnatal Ward at the Maternity Hospital.)
- ◆ Give 6 FP talks (3 motivational, 3 educational) in a group or individual setting.

Examination of several student *Clinical Practice Notebooks* showed that they have met those standards.<sup>1</sup> A review of the graduating exams (State Final) for 1993–1995 showed that a RH/FP question was one of the 5 essay questions included at least once a year.

#### Assessment of Physical Site

The school has two rooms: a classroom and a demonstration room. The demonstration room is approximately 24 by 17½ feet and has eight windows, each approximately 5 by 3 feet. Two panes in each window open out. Each window has security bars inside. Although there is no air conditioning in the room, good cross-ventilation is available when the windows are open. The room

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<sup>1</sup> A supervisor at the clinical practice setting signs off on each activity recorded.



has a very good electricity supply—according to tutors at the site, they have power almost all the time. (There were no power outages during the pilot test.) There are six 3-prong outlets in the room, three rectangular plates with two outlets each. Power is 220v, 50Hz. The maximum current available for computers was not determined, but four fluorescent lights ran during the day without wavering—even when a floor waxer, plugged into another outlet, was used at the same time. Surge protectors are available and used. A locked cabinet is available outside the demonstration room in the hall leading to the classroom. The school has no VCR or videotapes. The hospital (on the same grounds) has a television, which the school borrows on occasion. To complement classroom training, the school uses cassettes and videoscopes (an individual handheld device that resembles a viewfinder) to watch short flip-card films (titles, all from 1978, include diaphragm insertion, vaginal applicators, breast self-exam, pelvic exam, and IUD insertion and how to check strings—the IUD in this video is the Lippes loop). The school also has an overhead projector.

There are several computer companies in Bulawayo that could provide technical support including Burco Computer (phone: 263.9.70882), CompuServe (phone: 263.9.78985 or 78986), ICL Zimbabwe (phone: 263.9. 62794), and Unitech (phone: 263.9.66791 or 74141).



## APPENDIX D

### ModCal Post-Test Item Analysis

The ModCal post-test consisted of 35 multiple-choice items and was administered after the participant completed all of the modules. An item analysis was conducted on the post-test results to identify effective and ineffective items and to make recommendations regarding the revision of items for future use in ModCal packages.

An item analysis focuses on analyzing items using two basic statistics or indices: a difficulty index and a discrimination index. In addition, distractor effectiveness was examined. These measures are defined as:

- ◆ **Difficulty** is the percentage of participants answering an item correctly and ranges from 0% to 100%. Values of approximately 85% and above are expected in a CBT situation.
- ◆ **Discrimination** is the ability of the item to discriminate between high and low scorers and ranges from -1.0 to +1.0. Positive values are desirable; values from +.3 and above are ideal. In a CBT situation, however, where many of the participants are correctly answering the majority of the items, low positive discrimination values are often exhibited.
- ◆ **Distractor effectiveness** is the ability of each distractor to divert participants who are not sure of the answer. In a CBT situation it is likely that many items will have non-functioning distractors. If, over a period of time, no one selects a specific distractor, then it should be revised.

The average item difficulty was 76.6%. Three items had very low difficulty levels (21.4% for example). These low levels signal a problem with the item or distractors and indicate that these items should be revised before being used again. Removing these three items increased the average difficulty level to 80.7%. The average discrimination level was 0.28. Only one item had a negative discrimination value—this value was so low (-0.07), it was essentially zero. Distractor effectiveness is determined by inspection. Each item was reviewed and items with potentially poor distractors were noted and will be reviewed again following the next administration of these items.

The post-test items are valid in that they are based on the participant learning objectives. In terms of the item analysis, 32 of the post-test items appeared to possess acceptable difficulty levels. The majority of the items possess acceptable discrimination levels. With minor revisions, these items can be used in future ModCal post-tests.

# APPENDIX E

## Interface Changes

### General

- ◆ Changed the background color from red to light blue. While red is a striking color, a more soothing color is better for long hours of instruction on the computer.
- ◆ Separated the on-screen buttons to make them more distinct. When buttons were clustered, there were some problems with participants clicking on **Pause** instead of **Forward** and then not knowing to click on **Continue**.
- ◆ Added indicator that says which section they are in. They can see by clicking on the section bar, how many sections are in each module. Section bar allows participant to jump to sections rather than proceeding linearly.
- ◆ Added indicator to show which module the participant had either last completed or was last working on upon exit.

### Sign on

- ◆ Enlarged the on-screen buttons because many participants had difficulty manipulating the mouse in the beginning session (which for many was their first interaction with a computer).
- ◆ Added text to the sign-on to reinforce the audio because many participants were focusing on the screen trying to figure out what to do rather than listening to the audio.
- ◆ Eliminated need to press the **Enter** button on the keyboard and instead have participant manipulate the mouse and click on a **Continue** button. This limits the need to go back and forth between the keyboard and the mouse.
- ◆ Modified password screen so that if password is entered incorrectly twice, participant is brought back just to the beginning of **Sign on** rather than **Welcome to ModCal**.

### Welcome to ModCal

- ◆ Added section allowing participant to practice using the buttons rather than simply watching the computer go through the paces for them. Further described the **Text** and **Help** buttons because most participants didn't understand or use them in the pilot test.
- ◆ Instead of dragging items to an icon (trash can), the participant now practices clicking on the response to a sample progress review question. This new activity reflects more accurately the types of exercises participants perform in the modules.

- ◆ Modified exercise during “clicking and dragging” practice session, so that participant moves objects into order on a line. An example of this type of exercise is the HIV progress review in which participants put the steps of preventive counseling into the correct sequence.
- ◆ Added explanation of greyed-out and/or inactive buttons because participants did not understand that they could not click on buttons at certain times.

### **Pre- and Post-tests**

- ◆ Added screen after post-test which says e.g., “You got 15 correct of out 19 total questions for a percentage of 79.” The screen prompts the participant to see the comparison of pre- and post-test scores including the module breakdowns.
- ◆ Changed colors to increase contrast so that a selected answer is more easily distinguished from the text being read.
- ◆ Added prompt to allow participant to go directly to the pretest if they’ve already been through **Welcome to ModCal** and don’t want to repeat it
- ◆ Added randomized distractors in pre- and post-tests.