Developing Systems to Manage Health Workforce Pre-Service Academic Records

MCSP/HRH Liberia Case Study

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Background

A group of students in their second year midwifery class. Photo by MCSP.

The United States Agency for International Development (USAID)'s flagship Maternal and Child Survival Program's Human Resources for Health Project in Liberia (MCSP Liberia/HRH) worked with the Ministry of Health (MOH) to accomplish two key objectives: to build the capacity of pre-service education (PSE) faculty and educators and to strengthen the PSE learning environment. Recognizing the necessity for information systems to promote timely and informed decisions that enhance PSE quality, MCSP conducted an assessment in six PSE institutions (PSEIs) to understand the mechanisms used to store student academic records. Findings showed that PSEIs lacked a computerized system to record and manage student academic details, making timely reporting for the MOH, regulatory bodies, and students difficult. Moreover, reports generated through student physical folders were found to be inconsistent and unreliable, thus limiting PSEI capacity for informed decision-making.

To address these issues, MCSP initiated the design of a simple and secure PSE School Information System (PreSIS) to track and manage student details from application for admission through graduation. PreSIS was designed to be easily integrated with the PSEIs' academic processes to ensure accurate data entry. By utilizing PreSIS as part of academic procedures, PSEIs will be able to develop reports on time to meet their needs and the needs of the MOH, regulatory bodies, students, and other stakeholders.

MCSP is a global USAID initiative to introduce and support high-impact health interventions in 25 priority countries to help prevent child and maternal deaths. MCSP supports programming in maternal, newborn, and child health, immunization, family planning and reproductive health, nutrition, health systems strengthening, water/sanitation/hygiene, malaria, prevention of mother-to-child transmission of HIV, and pediatric HIV care and treatment. MCSP will tackle these issues through approaches that also focus on household and community mobilization, gender integration, and digital health, among others.

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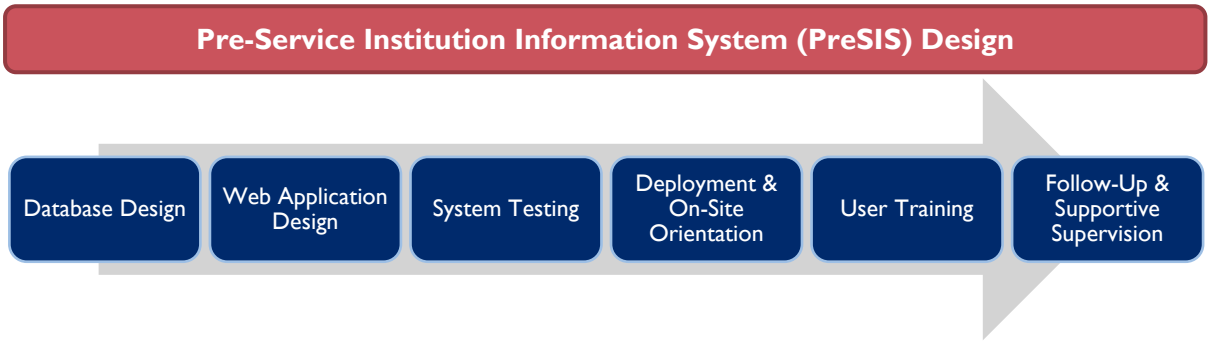
Methodology

Figure 1 shows the methods MCSP used to build the PreSIS; each is explained in more detail below.

Figure 1: MCSP PreSIS Design Methodology in Liberia



Database Design

MCSP designed the PreSIS data repository, which serves as the backend of the system, with two objectives in mind: to ensure that all student details are captured during academic processes and to ensure the quality of the data stored by implementing constraints and business rules where necessary. With these objectives in mind, MCSP gathered all PSEI data collection forms and reports used during the admission, enrollment, and graduation processes, as well as the courses ledgers for all programs offered. MCSP used these materials to determine the database requirements and to design a system that would allow input and validation of all necessary data. Finally, MCSP reviewed and revised the database with the PSEI registrars to ensure that its design facilitated accurate data entry, reporting, and analysis.

Web Application Design

Next, MCSP designed the web application (the frontend of the system), which concealed the complexity of the underlying data repository, allowing for easy entry and retrieval of data to and from the PreSIS database and managing user roles and access to different types of data. To identify the system requirements and determine which functions could be easily automated, MCSP interviewed registrars and other prospective users. Interview questions were grouped under various modules of the system (i.e., student admission, enrollment, graduation, and reporting). The interviews revealed that PSEI staff could not consistently articulate their needs from the system; thus MCSP provided significant support in outlining system requirements. After designing the web application based on the requirements, MCSP demonstrated use of the system to the PSEIs for feedback and validation. This process was valuable in ensuring PSEI buy-in to the system and their understanding of how it functions and responds to their needs.

The PreSIS web application homepage.

System Testing

After PreSIS development, MCSP tested different modules to determine system behavior and identify issues to be resolved before deployment. MCSP simulated all key PreSIS functionalities during this exercise, including exam scheduling, student registration, exam result entry, student admission, academic semester scheduling, student enrollment, course planning, and course grade entry.

Deployment and On-Site Orientation

After successfully resolving errors identified during system testing, MCSP deployed PreSIS in the PSEIs. These two-day deployment exercises included a review of all procured equipment (computers, network

cables, routers, etc.) to ensure accessibility and functionality and required MCSP to set up and configure new networks in some PSEIs and extend existing networks in others. Following placement of the server in a secure location, MCSP carried out onsite orientation and mentorship sessions with the registrars, which enabled registrars to enter old student records, gain familiarity with the system, and identify issues and areas of need before the training.

User Training

MCSP designed a five-day training to allow different cadres of PSEI staff to understand their roles and gain hands-on experience in using PreSIS. MCSP continuously identified prospective PreSIS users during system development and provided a clear description of the training to PSEI management to ensure that they assigned the appropriate staff to be trained. Seventeen PSEI staff members representing six PSEIs attended, including registrars, directors, information technology (IT) staff, deans, and training managers. At the training's conclusion, PSEI staff gave their feedback on PreSIS and discussed its importance. PSEIs also made suggestions for PreSIS improvements, which will be included in system updates.

Follow-Up and Supportive Supervision

To ensure that PSEIs use and maintain PreSIS after MCSP's close-out, MCSP established a supervision checklist to continuously evaluate PreSIS accessibility, use by the registrar, use by management, and maintenance and support from IT staff. The Program also provided on-site training for internal supervisors on use of the tool and on methods for addressing identified issues.

PreSIS training participants with their certificates. Photo by MCSP.

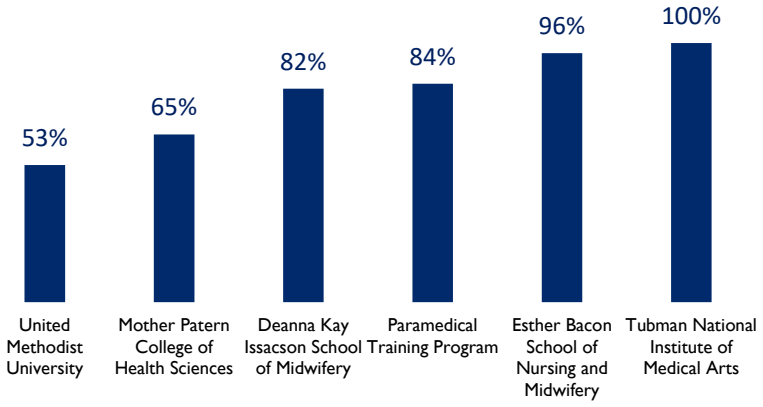
Staff indicated that initial supervision visits were helpful, especially in ensuring effective IT staff maintenance. Visits showed that PSEIs were using the system effectively: registrars were entering data, and management were discussing PreSIS data during their regular meetings. Moreover, the deans and directors were following up with the registrars to ensure data entry.

Key Results

After three months of PreSIS use in PSEIs, MCSP used the supervision checklist to evaluate its effectiveness, identify challenges, and enact solutions to resolve issues.

Figure 3 shows the overall score obtained by each PSEI during the supervision visit. The results showed that in most schools, the system was functioning effectively after only three months of implementation, with four of the PSEIs obtaining a score higher than 80%. The lower scores in the remaining two institutions were a result of internal network issues. In those institutions, MCSP worked with IT staff to identify and resolve the causes of the problems and develop procedures to resolve future issues. MCSP also conducted a special

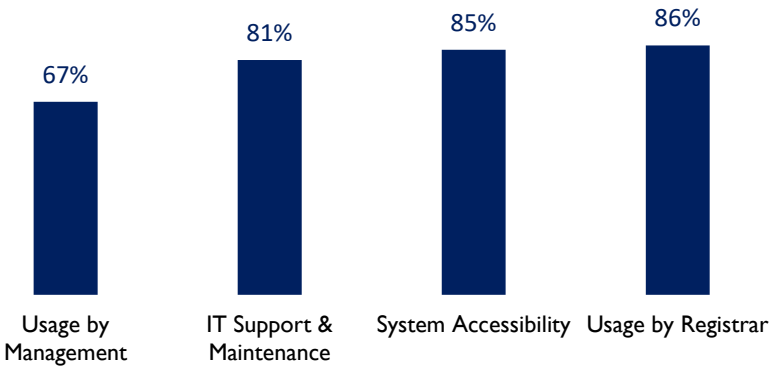
Figure 3. PreSIS Supervision Score in Each PSEI



onsite orientation at United Methodist University, the lowest-scoring PSEI, to strengthen interest in and use of PreSIS there.

The supervision score by assessment area is shown in Figure 4. The assessment showed that PreSIS is used by the registrar, accessible, and supported and maintained by IT staff, with each area receiving a score of more than 80%. However, usage of the system by management received a lower score of 67%. To improve this score, MCSP conducted onsite orientations for management to highlight the availability of timely reports from the system. The Program expects that management usage will increase as data becomes more available in the system to inform effective decision-making.

Figure 4. PreSIS Supervision Score by Assessment Area



Lessons Learned

MCSP's experience in designing PreSIS and working with end users led to valuable lessons learned:

- While the PSEI registrars and end users understood the need for a system to manage academic records, they needed support in articulating specific PreSIS requirements. MCSP provided opportunities for them to engage with the system from the early stages of its design. This engagement provided them with concrete experience that helped them in outlining requirements and informing implementation.
- The collection of forms, courses ledgers, reports, and other documents used by the PSEIs was very helpful in designing an appropriate system that fully covered the project scope.
- The network infrastructure assessment conducted in the PSEIs during the requirements gathering phase aided in outlining deployment action plans.
- Trainings can help address system malfunctions and misunderstandings between designers and users and may be more effective if done before system deployment.

Recommendations

MCSP recommends the following for future similar projects:

- PSEI management and end users must be highly involved in initial discussions about the system to outline its scope.
- Designers should determine priorities and dependencies during the system's design phase, which will help in managing the time, cost, and scope of the project.
- Designers should use scenarios and case studies in interview questions during information gathering to obtain answers that fully explain the steps required to complete specific processes.
- To avoid misunderstandings between developers and end users on the system's functionalities, developers should orient end users to the system to get their feedback for incorporation during the design phase.
- Future projects should conduct user trainings before system rollout to allow issues encountered during trainings to be easily addressed.
- The project implementation plan should outline all activities to be completed including procurements.
- PSEI leaders and management must be involved in all aspects of implementation to ensure effective system usage and sustainability.