A. **Purpose**

Aviation training is expensive and complicated. A properly designed curriculum must clearly define the course objectives and provide a logical means for achieving these goals. ICMS is a framework for designing these curricula. The framework is designed around NAVEDTRA 130 which is the governing format for task-based curricula in the Navy.

Without ICMS, the officers responsible for aviation training have no means of checking the validity of their curricula except by hand. The average curriculum officer has neither the time nor the expertise to audit a curriculum in use. Most officers have stopped tracking the relationships between course objectives and the graded items on a curriculum event. The training time spent accomplishing each curriculum objective is no longer verifiable. Training officers simplified their training time analysis by applying scalar factors to curriculum events. These erroneous factors are manipulated to yield "best guess" estimates of resource requirements and curriculum length. These estimates have not borne out well under audit.

ICMS offers relief for training officers. It monitors events, tasks performed on each event, curriculum objectives, and training resources. ICMS automatically generates the required audit reports for curriculum management.
B. Requirements

ICMS is designed to meet three general application requirements. First, the program is user-friendly and has an intuitive menu-driven interface. Also, the system generates reports that are valuable enough to warrant the effort of initial data entry. Finally, data maintenance through ICMS is easy, thorough, and guarantees that the curriculum structure will remain intact.

C. Users

ICMS is designed to be used primarily by the officers directly responsible for aviation training curricula. These officers are experienced instructor pilots, who normally have a tour of duty of about one year as curriculum officers. This duration does not permit the officers to spend large amount of time learning arcane computer applications.

The officers are college educated, frequently in an engineering or technical discipline. Each officer is issued a PC/AT compatible desktop computer, and is offered instruction in WordPerfect and dBASE.

Training Officers maintain hundreds of pages of curriculum documentation in WordPerfect files. The documents are required to comply with a standard format. Maintaining these files is tedious and is a source of frequent input error.
II. Background

A. Naval Aviation Training

Each naval aviator progresses in his or her training through three phases: primary, intermediate and advanced. At the end of the primary phase, the student naval aviator proceeds into one of four "pipelines." The four pipelines are Maritime (for pilots bound for multi-engine propeller aircraft), Rotary wing (for those bound for helicopters), E-2/C-2 (providing pilots for the Navy’s version of AWACS), and Strike (for jet pilots). Each of these phases of flight instruction is maintained as a separate curriculum. A Pipeline Training Officer (PTO) is responsible for the pipeline curricula which feed his respective warfare specialty.

The Naval Air Training Command (or NATRACOM) is responsible for the training of all Naval Aircrew. This includes Naval Aviators, Naval Flight Officers, and Enlisted Aircrew. Additional responsibilities extend to the training of aviation related sub-specialties such as Aviation Intelligence Officers and Flight Surgeons. The NATRACOM receives resources from its parent command, the Naval Education and Training Command (NAVEDTRACOM). NAVEDTRACOM instructions contain the guidelines for instructional curricula.

The Chief of Naval Air Training (CNATRA, pronounced "si-na-tra") is the parent command for the NATRACOM. CNATRA is normally a Rear Admiral, and keeps his headquarters aboard NAS Corpus Christi. CNATRA is the Curriculum Authority (CA)
and supports the subordinate commands in implementing the curricula. The headquarters staff maintain the flight training instructions and the curriculum instructions.

B. Curriculum Management

Managing curricula according to Naval Education and Training Command instructions is time consuming and exhausting. The curricula must each conform to a rigidly defined structure. A hierarchy must be maintained between course objectives, terminal objectives, enabling objectives, and the tasks within each module. The intent of this structure is to provide logical links between every event within a course through the overall course objectives. The construction of a curriculum can then be a straightforward process of determining the specific actions required to accomplish a given course objective. Syllabi are not subject to individual instructor interpretation and can be implemented in a highly standardized manner.

Changes or improvements to a curriculum in service are awkward. Training officers must retrace the desired changes all the way back to the original course objectives. The structure becomes a significant burden to curriculum managers. This overhead is a major obstruction to rapid and responsive curriculum changes. If the hierarchy is properly maintained, every task in a course will directly support the objectives; but the structure is difficult to maintain. Over time, this structure breaks down. The time
needed to restructure the curricula by conventional means is simply not available now.

In any military organization there is a rapid turnover of the personnel. The replacement curriculum officers have little training in instructional curriculum development, thus they feel little compulsion to maintain the hierarchical structure.

The training officers have requested a common automated system to provide an efficient and effective means of maintaining the logical links throughout the curricula. ICMS is a response to their request.

C. Instructional Model.

Prior to the Viet-nam era, training flights were based on simple conventional wisdom and instructor preference. There was an innate lack of instructional standardization between sites that supposedly taught courses with the same objectives. In the late 1960's, the U. S. Navy began to revise all the courses it taught. The Chief of Naval Education and Training organized an instructional manual to give curriculum managers a structure and model upon which all syllabi could be based.

This model, known as task-basing, was designed around a hierarchy of instructional goals. This was the first attempt to organize the multitude of instructional curricula taught by nearly every type of school command, serving both the surface and subsurface navy, as well as aviation training. The re-organization was intended to simplify the curriculum management process. The model evolved to become an
enduring Navy standard known as NAVEDTRA 110. The structure involved a system of objectives and supporting tasks. It ensured uniformity and completeness within any course.

The task-based curriculum model has all student tasks performed within a course related to one or more overall learning objectives. These are called Terminal Objectives (TOs). The tasks themselves are termed Enabling Objectives (EOs) and are linked to TOs they supported. Each of these tasks are analyzed to determine resource requirements, instructor requirements and training time. Curriculum specialists assimilate the data to determine a logical order of instruction. They arrange the sequence by defining prerequisites for each task. From this outline, of instruction a course master schedule is derived. This information is included in what is known as the curriculum instruction.

Supporting materials are developed after the course is well defined. The required definition consists of lesson plans, a student master curriculum guide, grade sheets for each event (Aviation Training Forms, or ATF) s, various workbooks, and a training manual known as the Flight Training Instruction or FTI.

Each document is dependent on all others. A change in the master curriculum guide, for example, results in corresponding alterations to the workbooks, and lesson plans, and ATFs.

While the NAVEDTRA 110 model is straightforward for courses lasting from several days to a few weeks, the overhead involved in curriculum modifications is substantial.
Moreover, aviation curricula can span several months and hundred of training events. The structure is much more sophisticated. Aviation training requirements must be responsive to the changing demands of the fleet. The changes to the curricula come frequently and can range from simple updates in techniques to mass modifications to the entire structure of pilot training.

D. Significance.

It was clear by the mid seventies that the Naval Air Training Command (NATRACOM) was peculiar in its curriculum developmental needs. The curricula, reorganized years before, had begun to lose the logical links which guaranteed continuity. The Chief of Naval Air Training (CNET), informally granted NATRACOM a variance from the NAVEDTRA 110 standards. This latitude was used by aviation curriculum managers to circumvent the inherent validation process the NAVEDTRA structure provided.

The curricula became less organized over the next decade, and standardization became more and more difficult to enforce. Although the course managers valiantly tried to reorganize, the magnitude of the revision process precluded regaining total NAVEDTRA 110 compliance.

E. Present Working environment.
The curricular hierarchical structures are in disarray. The course material was maintained by hand for decades, using nothing more sophisticated than a typewriter. The training officers have only recently have started using wordprocessors to produce the course instructions and related documents. There is still resistance to change. There is concern that new methods will be more work, therefore any new system must be intuitive and must employ familiar terminology. Systems that require any significant training have been historically unsuccessful.

Much attention is devoted to monitoring the implementation of the various curricula, but no real effort is dedicated to developing a set of tools for managing the actual curriculum documents. Since only a dozen individuals work directly with these materials, it seems difficult to justify the requirement for an automated system developed for such a limited groups of users. The development is justified, however, considering the impact that these curricula have on all of naval aviation.
Integrated Curriculum Management System

Corpus Christi State University Graduate Project Report

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Abstract

Integrated Curriculum Management System

ICMS is a relational database application which automates the management of instructional flight curricula within the Naval Air Training Command. The program is written in the FoxPro host language, a super-set of dBASE III+. The system is designed to run effectively on a personal computer under MS-DOS 3.2 or higher. This application aids in engineering aviation curricula conforming to MILSTD 1379D. ICMS vastly reduces the time spent in production of course related documentation, and streamlines other tasks involved in managing the curricula.
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