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An Innovative, Multidisciplinary Educational Program in Interactive Information Storage and Retrieval

A Thesis Presented to
The Graduate Faculty of
The University of Southwestern Louisiana

by
Mary C. Gallagher
January 1985
OVERVIEW OF PRESENTATION

1. INTRODUCTION
   1.1 Background
   1.2 Thesis Statement

2. REVIEW OF THE LITERATURE
   2.1 Definitions
   2.2 Survey of Projects
      2.2.1 The Enterprise Milieu
      2.2.2 The Educational Milieu

3. CONCEPTUAL FRAMEWORK AND METHODOLOGY
   3.1 Research Objectives
   3.2 Critical Considerations
   3.3 Management Phases of the Research

4. NEEDS ANALYSIS
   4.1 Questionnaire Development
   4.2 Results Interpretation and Implications

5. COURSE DEVELOPMENT PHASE
   5.1 Overall Course Development
   5.2 Course Deliverables Development
6. **COURSE DISTRIBUTION PHASE**
7. **COURSE EVALUATION PHASE**
8. **EXTENSIONS AND ENHANCEMENTS**
   8.1 Additional Systems
   8.2 Additional Disciplines
   8.3 Maintenance Activities
9. **PERSONAL COMPUTER R&D CONTRIBUTIONS**
   9.1 The Research and Development Environment
   9.2 Educational Support
      9.2.1 The NASA/RECON Emulator
      9.2.2 Interactive Presentation Development System
   9.3 Workstation Support
10. **FUTURE ISSUES**
   10.1 IS&R System Developments
   10.2 The NASA/RECON Project
11. **SUMMARY**
SOURCES OF LEARNING

Database Processors

Training

Workshops

System Specific

Hands-On

Schools

Education

Librarians

Limited Usage

Fragmentary Development
LEARNING AIDS

Conventional
Syllabi
Workbooks
Bibliographies

Online
Simulators
Emulators
Tutorials
Local Database Systems
<table>
<thead>
<tr>
<th>School</th>
<th>Search Package</th>
<th>Mode of Use</th>
<th>Database(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aberdeen</td>
<td>IRSINT</td>
<td>online</td>
<td>DINDEX-3000 clippings on communication</td>
</tr>
<tr>
<td>Birmingham</td>
<td>FIND-2</td>
<td>online</td>
<td>ARPAM-5500 pamphlets on architecture</td>
</tr>
<tr>
<td>Brighton</td>
<td>BIRP</td>
<td>batch/online</td>
<td>Records input by students</td>
</tr>
<tr>
<td>Leeds</td>
<td>FAMULUS</td>
<td>batch</td>
<td>500 MARC record</td>
</tr>
<tr>
<td>Liverpool</td>
<td>FIND-2</td>
<td>batch/online</td>
<td>Records input by students</td>
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<tr>
<td>Loughborough</td>
<td>SIMULATOR</td>
<td>online</td>
<td>40 items on librarianship</td>
</tr>
<tr>
<td>Manchester</td>
<td>FIND-2</td>
<td>batch/online</td>
<td>Records input by students</td>
</tr>
<tr>
<td>Newcastle</td>
<td>(unnamed)</td>
<td>online</td>
<td>1000 items on social work</td>
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<tr>
<td>Sheffield</td>
<td>FAMULUS</td>
<td>batch</td>
<td>Records input by students</td>
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Local Databases at UK Library Schools
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<thead>
<tr>
<th>Skill Level</th>
<th>Number of Trainees</th>
<th>Average Hours on TRAINER</th>
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<tr>
<td>6</td>
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<td>4</td>
<td>13</td>
<td>4.7</td>
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<tr>
<td>3</td>
<td>6</td>
<td>4.7</td>
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<tr>
<td>2</td>
<td>3</td>
<td>3.5</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>6.3</td>
</tr>
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</table>

**TRAINER Skills by Online Time**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Number of Trainees</th>
<th>Average Skill Level</th>
<th>Average Hours on TRAINER</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-49</td>
<td>9</td>
<td>4.2</td>
<td>10.9</td>
</tr>
<tr>
<td>25-39</td>
<td>34</td>
<td>3.4</td>
<td>6.3</td>
</tr>
<tr>
<td>18-25</td>
<td>18</td>
<td>3.1</td>
<td>4.4</td>
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**TRAINER Skills by Age Group**
### Typing Skills by Typing Skills

<table>
<thead>
<tr>
<th>Typing Skill</th>
<th>Number of Trainees</th>
<th>Average Skill Level</th>
<th>Average Hours on TRAINER</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>15</td>
<td>3.0</td>
<td>8.8</td>
</tr>
<tr>
<td>1</td>
<td>26</td>
<td>3.5</td>
<td>5.8</td>
</tr>
<tr>
<td>2</td>
<td>17</td>
<td>3.5</td>
<td>5.76</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>4.4</td>
<td>5.0</td>
</tr>
</tbody>
</table>

### TRAINER Skills by Language Group

<table>
<thead>
<tr>
<th>Language Group</th>
<th>Number of Trainees</th>
<th>Average Skill Level</th>
<th>Average Hours on TRAINER</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>42</td>
<td>3.6</td>
<td>7.7</td>
</tr>
<tr>
<td>Non-English</td>
<td>19</td>
<td>3.3</td>
<td>8.0</td>
</tr>
</tbody>
</table>

TRAINER Skills by Language Group
PROJECT OBJECTIVES

Set of Courses

Hands-on Usage

Science and Engineering Students

Transportable Courses
MANAGEMENT PHASES OF NASA CONTRACT

A. Needs Analysis
B. Course Development
C. Pilot Course Administration
D. Pilot Evaluation
E. Development of Distribution Plan
F. Implementation of Distribution Plan
G. Conduct of Regional Seminars
H. Conduct of On-Site Seminars
I. Coordination of Request Processing and Information Dissemination
J. Course State-of-the-Art Enhancements
K. Institutional Surveys and Evaluations
L. Graduated Student Surveys and Evaluations
M. Periodic Statistical Summary Reporting
OVERALL COURSE DEVELOPMENT DIAGRAM

Needs Analysis Survey --> Deliverables Development --> In-House Evaluation --> Final Product
COURSE DELIVERABLES DEVELOPMENT DIAGRAM

Outline
---

General References
---

System References
---

Visuals
---

Online Searches
---

Lesson Plans
---

Handouts
---

Instructor Notes
---

Usage Assignments and Keys
---

Homework Assignments and Keys
---

Examinations and Keys
---
CLASS NO. 4

SUBJECT   User Categorization

TOPICS   Rationale, Categorization Parameters, and Category Definitions

TIME   1 hour

MAJOR OBJECTIVE(S): To justify multiple user categories and define the different types of users of information systems.

SPECIFIC OBJECTIVES:

1. The learner will understand that information systems must serve the needs of a heterogeneous population.

2. The learner will be able to identify and define different classes of users.

RESOURCE MATERIALS NEEDED:

1. Visuals
RECOMMENDED READINGS:


OUTSTANDING ASSIGNMENTS: None.

ACTIVITIES:

---STUDENT ORIENTED---
1. Note-taking
2. Discussion

---INSTRUCTOR ORIENTED---
1. Foil presentation
2. Examples of different types of users

SUMMARY OF LESSON:
The lesson will discuss the different user requirements, the rationale behind these requirements, and the different functions of each user category.
FOCAL POINTS (test areas):

1. User requirements.
2. User functions.
3. User categories.
4. Needs of each category of users.

INSTRUCTOR'S NOTES


**CATEGORY DEFINITIONS**

... Data Base Administrators

\{ \text{One per Data Base} \} 

... Maintain Individual Data Base

... Provide Structure and Information Content of the Data Base

... Provide Security and Integrity Controls for the Information in the Data Base

... Provide Liaison Between End Users and Application Programmers

... Monitor and Evaluate Data Base Performance

... Provide Feedback to the System Administrator

\{ \text{For example, if changes are needed in the DBMS software, the DBA will refer to the System Administrator. Generally speaking, anything "outside" and "above" the DBA's authority is sent to the system administrator. Thus, there exists a hierarchy of users.} \}
Two special categories of "End Users" will be described in the next foils: the Parametric Users and the Casual Users.

*** Parametric Users

*** Invoke Pre-Defined Procedures

Using a menu-driven system

*** System-Initiated Dialogue

User answers queries issued by the system

*** Input Information Requested by System

*** System Function Invoked by Input

*** Interact with a Data Base in a Routine Manner

The system is accessed in the very same way every time
Example

The best example of a parametric user would be the user of an electronic bank teller. The user follows a menu which always leaves him some choice, including the choice to cancel his queries, and/or leave the system.

Some IS&R systems, such as Westlaw and Lexis - both designed for lawyers -, are built with the very same philosophy: that is, to free the user from the burden of learning and remembering query languages. Thus the instructions are clear and concise, while the keyboard used in accessing such systems hold some helpful keys such as:

HELP keys, NEXT PAGE keys, NEXT CLIENT keys, YES/NO keys ...
BASIC RECON TRAINING

1.A. Find the number of references to ACID RAIN in file collection D using the Thesaurus Term, the Title, the Abstract, and the Analytic Note.

*** D = 416 hits

B. Find same in file collection F(books) using the Thesaurus Term, the Title, the Sub(LC Indexing), and LT for ACID and RAIN (combined).

*** F = 57 hits

C. The same for file collection P.

*** P = 473 hits

2. Identify by Accession Number the document containing the definition of "Flying Peanut"?

*** 83A16400

3. Find Accession Number for NASA-TM-85141

*** 83N13147


*** 83N13623
A predefined output format refers to the appearance of the data retrieved by a search as presented to the user who requested the search. A predefined format means that the system defines the format by which the data will be displayed (i.e. spacing, line size, page size, etc.).

Online output allows interaction on the user's terminal with the retrieved data. Offline generation requires a request by a user for data which is output at a distant facility and sent to the user.
6.2(K). What index terms would you assign to any scientific document?

8.1(C). Describe the measurement parameters included in user error and error recovery analysis?

There are three measurement parameters:
1) ERROR RATE: measures changes over time of the number of errors made by the user.
2) TYPE of ERROR
3) USE OF HELP COMMANDS
8.2(K). Define Recall.

... Recall measures the ability to retrieve from the system as much relevant information as possible.

8.2(K). Define Precision.

... Precision measures the ability to retrieve from the system only the desired information.

8.2(AP). Let the number of relevant documents retrieved be 10, and the total number of documents in the data base be 20. If the total number of documents actually retrieved is 15, find the Recall Ratio and the Precision Ratio.

... 

Recall : 10/20 (50%) Precision: 10/15 (66.6%)
8.2(C). Describe at least three human factors to be considered in traditional obtrusive user monitoring.

...  

1/ Human Behavior Characteristics (human behavior may change considerably under different circumstances).

2/ Variability Control (Experiments to measure performances of different groups under different conditions require that the groups be selected in such a way that their overall characteristics are nearly identical).

3/ Legal and Moral Factors (The information collected can not be legally used without the permission of the subjects. The experimenter has the responsibility to protect the users' confidentiality).

4/ Impact on User Actions (The users interactions with the system may be inhibited if he believes his actions are identifiable).
COURSE DEVELOPMENT STATUS

Course Material Documentation Templates (Final)
Standards for Visuals Outlines (Final)
Standards for Visuals (Final)
Outline of Course Visuals (2nd Draft)
Course Visuals (1st Draft)
Lesson Plans (1st Draft)
Homework Assignments with Answer Keys (2nd Draft)
Usage Assignments with Answer Keys (1st Draft)
Instructor Notes (1st Draft)
Additional Support Handouts
Examinations with Answer Keys (1st Draft)
Bibliographies
MAJOR CATEGORIES OF ACCOMPLISHMENTS

Project Control

Needs Analysis

Project Working Paper Series

Course Development Working Paper Series

PC R&D Working Paper Series

Other Research Support
PC R&D Project

- Establish PC R&D Environment
- Integrated PC Workstation
- PC-Based IS&R Education Tools

OBJECTIVES:

- Continual Evaluation
- Develop Methods & Specifications
- Identify & Evaluate Projects
- Local Environment Interface
- Remote Interface
- Distributed Interface
- Prototype PC Workstation
- NASA/RECON Emulator
- IS&R Emulator Generator
- Interactive Presentation Development System

Relationship Between PC R&D Goals
FUTURE OF IS&R SYSTEMS

Types of Systems
   Bibliographic
   Numerical
   Representational
   Referral

Pre-Processing
   Intelligent Interfaces
Post-Processing
   Knowledge Retrieval
STEPS IN WISDOM RETRIEVAL

1. Choose and Contact Database
2. Choose Terms
3. Construct Query
4. Examine and Evaluate Results
5. Retrieve References
6. Locate Documents
7. Get Copies
8. Study Material
9. Assimilate Relevant Facts
FUTURE OF THE NASA/RECON EDUCATION PROJECT

Short Term

Define Additional Course Configurations
Pilot Administration
Pilot Evaluation
Distribution Plan Development
Additional Systems
Additional Disciplines
SYSTEM INCORPORATION DIAGRAM

COURSE
  Hooks

HOMEWORK
  Hooks

NASA/RECON

EXAMINATIONS
  Hooks

USAGE
  ASSIGNMENT
  Hooks

HANDOUTS
  Hooks

PRESENT

OTHER SYSTEMS

FUTURE
DEVELOPMENT PLAN FOR THE SET OF 4 COURSES

- 1-2 Day Intensive Workshop
- 6 Week Mini Course
- 12 Week Full Quarter Course
- 18 Week Full Semester Course
FUTURE OF THE NASA/RECON EDUCATION PROJECT

Long Term

Distribution

Evaluation

Extensions

Enhancements

Non-Educational Institutions

Request and Information Processing

Result Reporting
CONCLUSIONS

End User Education

Co-ordinated Materials

Complete

Varied

Extensions

IS&R Systems

Disciplines

Enhancements

Improvements

Updates

Transportability

This report represents one of the 72 attachment reports to the University of Southwestern Louisiana's Final Report on NASA Grant NGT-19-010-900. Accordingly, appropriate care should be taken in using this report out of the context of the full Final Report.