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ABSTRACT

This paper describes the use of a management process, Systematic Curriculum and Instructional Development (SCID), for developing online multimedia modules. The project, "Collaboratively Creating Multimedia Modules for Teachers and Professors," was funded by the USWEST Foundation. The curriculum development process involved teams of experts in teaching, computer science, and multimedia technology. The primary focus of the project was to teach college professors and K-12 teachers how to utilize multimedia to enhance their classroom instruction. The SCID process captured the content before the multimedia development strategy commenced to create electronic modules. The SCID process consists of five phases: analysis--uses needs analysis, job analysis, and task analysis; design--outlines the overall curriculum and develops the foundation for the training program; instructional development--determines what will be taught, what learning activities, materials and methods will be used, develops the learning guides, field testing, pilot testing, and revision processes; training implementation--activates the training plan, its evaluation, and documents learner achievement; and program evaluation--evaluates each of the five phases, including product, phase, and process evaluation. Each phase of the SCID process is described in detail. The SCID process proved to be an ideal management process among part-time people who worked on an irregular timetable. It kept all participants on task and bonded developers to a common language with a specific purpose. (SWC)

Web Pages Created Via SCID Process

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TRI-COLLEGE UNIVERSITY EDUCATIONAL LEADERSHIP PROGRAM

The purpose of this **presentation** is to share information and answer questions about how an educational leadership program has evolved during the past seven years toward providing multi-faceted distance education opportunities. The faculty is also involved in and/or responsive to North Dakota State University's Information Technology Roundtable which developed proposals to restructure university-wide services to accommodate and promote distance education. Likewise, faculty have utilized email extensively for groupwork. This year one member delivered a distance education inservice courses about technology in the classroom via Public Television statewide microwave towers. The three Fargo-Moorhead institutions of Tri-College University installed a T-1 Intranet connection between facilities to facilitate telecommunication interconnections. The Tri-College University initiated an on-line web access for the entire program to enhance communications for recruitment and service to graduate students currently in the program.
http://www.ndsu.nodak.edu/ndsu/tricollege/

This session is about a management process for developing online multimedia modules

The USWEST project was entitled, "Collaboratively Creating Multimedia Modules for Teachers and Professors." This curriculum development process involved teams of experts in teaching, computer science, and multimedia technology. Primary focus of the project was to teach college professors and K-12 teachers how to utilize multimedia to enhance their classroom instruction.
[http://www.ndsu.nodak.edu/instruct/stammen/uswest]

This project was a challenge for faculty and administrators who were not accustomed to developing their own text material for students. Most educators are not trained to develop their courseware. Many members had experience preparing content in sequential, print-based media but most lacked expertise to technologically place such data for non-sequential, electronically dynamic interaction. The instructional requirements for each learning task contain specific performance standards which are utilized to determine training approaches for developing learning objectives, performance measures, and aspects of the training program regarding faculty needs, needed equipment, and subsequent support. This systematic procedure establishes the sequence for developing competency profiles, related materials, supportive media, modules and/or learning guides, and field-tested procedures to judge the extent competency-based (learning) objectives are achieved in the process. This is done according to an array of outcomes and specific recommendations which are part of the Program Evaluation and Improvement Plan developed for both the pilot and actual implementation phases. The SCID procedure used a DACUM process (see inset) to outline a series of duties. A task analysis procedure determined how many tasks it would take to accomplish a duty. Two people were assigned to each duty to create a module. In summary, the SCID process captured the content before the multimedia development strategy commenced to create electronic modules. Evaluation procedures were used throughout the project. Team members responding to these inquiries indicated that the SCID process proved to be an ideal management process among part-time people who worked on an irregular timetable. It kept all on task and bonded developers to a common language with a specific purpose.

The results from field testing the thematic-based pilot projects utilizing customized multimedia carts in five K-12 and two higher education institutions were compiled during the summer of 1997. This website and data are used by the presenter for Ed 722 Instructional Media and Materials, Ed 733 Technology and Networking, and Ed 785 Organization and Administration of Vocational Education.

Five Phases of Systematic Curriculum and Instructional Development (SCID) used to Manage the Project

Phase I: Analysis - uses needs analysis, job analysis, and task verification processes. (Utilizes a special process called DACUM (an acronym meaning Develop A CUrriculuM)

Phase II: Design - outlines the overall curriculum and develops the foundation for the training program.

Phase III: Instructional Development - determines what will be taught and what learning activities, materials, and instructional methods will be used; develops the modules which are comprised of learning guides including supportive multimedia methods; field testing; pilot testing and revision processes.

Phase IV: Training Implementation - activates the training plan, its evaluation, and documents learner achievement.

Phase V: Program Evaluation - evaluates each of the five phases, including product, phase, and process evaluation.

(The Systematic Curriculum Instructional Development (SCID) model (©1990) was created at the Center for Education and Training for Employment (CETE) at The Ohio State University, Columbus, Ohio.)

The question asked the Panel of Experts in the brainstorming process: "What do you do when working with multimedia/technology?"

Job Analysis. Twelve local men and women were selected to participate on a panel of experts or the DACUM Panel. Each individual profiled expertise in different skills and competencies and were considered to be top performers in their area. To reflect the range of teachers who would eventually be involved in the training, the panel needed to represent a cross-section. The DACUM Panel (or Panels of Experts) was comprised of twelve people:

Responses by the DACUM Panel:

- Help people with design.
- Instruct students on how to keyboard.
- Shorten the learning curve.
- Teach beginning students word processing.
- Identify "teachable" moments with teachers and students.
- Acclimate kids to technology.
- Market technology to teachers and administration.
- Encourage learners to discover new ways of doing things.
- Answer learner questions on how to do something.
- Evaluate and create new technology.
- Teach kids computer applications.
- Identify and seek help from technology leaders.
- Consult users on audio and visual aesthetics
- Encourage students to problem solve with computers.
- Help teacher see that technology is a tool.
- Integrate computer with curriculum.
- Manage and allocate district resources for technology.
- Encourage kids to be bold and creative.
- Foster learning environments that models constructivist approaches.
- Assist students in developing new communication techniques.
- Problem solve when hardware/software doesn't work.
- Write about technology.
- Independent tutorials with computers.
- Make learning enjoyable-- create desire to learn.
- Expand student horizons/knowledge base.
- Foster cooperative/collaborate learning.
- Be part of long-term planning.
- Share what you've learned.
- Share the responsibility.
- Provide ongoing in-service/continuing education.
- Be innovative in acquisitions/funding.
- Be innovative in working with other faculty and students.
- Troubleshooting.
- Servant-leader.
- Create safe environment for learning (student/teacher).
- Reduce barriers for student/teachers.
- Provide reassurance and encouragement.
- Rethink and analyze the best use of tools-computers, etc.
- Dependence--interdependence--interdependence.

While addressing the question--"*What do you do when working with technology?*"--in the brainstorming process, the DACUM Panel became confused. Since the roles of the DACUM Panel were so diverse, their responses were not blending. After about a half day in the process, they focused on the targeted group-the classroom teacher. The new brainstorming question was then stated: "What does the **classroom** teacher do when integrating multimedia into the classroom?" The following list was given in response to that question:

- Illustrate ideas or concepts.
- Consider technology as an integrated item.
- Know what technology is available and how to use it.
- Evaluate existing curriculum.
- Have an idea when technology can improve curriculum.
- Include technology in curriculum outcomes.
- Prototype--experiment/try new things.
- Research curriculum ideas/concepts/methods.
- Don't force technology into curriculum.
- Share ideas with colleagues.
- Work with colleagues.
- Design materials.
- Break old paradigms.
- Talk to students.
- Listen to students.
- Select/recommend equipment.
- Review available technology.
- Learn available technology.
- Match technology with learning tasks.

After two full days, under the guidance of the CETE facilitator, the DACUM Panel generated a DACUM chart--the product of the *job analysis* process. The chart encompassed a list of general *duties* and many specific *tasks* for each of the duties. They also arranged the duties and tasks in a meaningful order.

The DACUM chart, the *duties* and the number of *tasks* it encompassed, follows:

Duty A: Acquire Basic Computer Skills (6 tasks)
Duty B: Improve Curriculum with Multimedia (14 tasks)
Duty C: Deliver Instruction with Multimedia (12 tasks)
Duty D: Utilize Support Services (5 tasks)
Duty E: Enhance Teacher Communication with Multimedia (12 tasks)
Duty F: Promote Multimedia in the Classroom (6 tasks)
Duty G: Pursue Professional Development (10 tasks)

The DACUM process provided for brainstorming to address additional areas of significance for teachers to consider when integrating multimedia into their classrooms and curriculum. The categories addressed and highlights of the information generated follows:

1. **General knowledge and skills**: problem solving, computer standards, technical terms, assessment skills, copyright, communication skills.

2. **Worker behaviors**: pro-active, creative, flexible, risk-taking, organized, facilitator, coach, team player, resourceful, visionary, positive, sense of humor, open-minded.

3. **Tools, equipment, supplies, and materials**: (minimum items) computer, printer, disks, storage media, software, cable, modem, (other) CD-Rom, digital and video cameras, video disk player, lcd panel, multimedia data banks, sound cards, VCR.

4. **Basic media skills**: computer skills, commonly used software - word processing, data base, communications, spreadsheet, graphics, authoring, presentations.

5. **Future trends/concerns**: virtual reality, video conferencing, collaborative work, changing standards, limited resources/funding, copyright,.restrictive regulations, high speed networks, voice recognition, diverse student needs, equal access, inappropriate electronic materials, teacher time, rapid technological changes, information overload, ethical issues.

Task Verification. The purpose of the *Task Verification* process is to solicit additional expert workers, and/or immediate supervisors of such workers, for the purpose of adding/deleting tasks and ranking the tasks on such critical factors as importance to the overall job success and the task learning difficulty.

An additional thirty qualified individuals reviewed and verified the DACUM list of *duties* and *tasks* in the *Task Verification* process. The question they asked themselves when completing the questionnaire was "Is this *duty* and *task* actually performed by the teacher using multimedia technology?" A comment section was available following each. Once the DACUM duties and tasks were verified, it was sent to CETE where it was printed and returned for distribution to all personnel associated with the project. The results are in Appendix B.

Task Analysis. Each task was then broken down into the steps and activities necessary to master the task. At least three people were involved in the *Task Analysis* process. The participants provided information in the following areas: steps involved (at least two); performance standards; tools, equipment, materials and supplies necessary; related knowledge required; safety concerns; attitudes involved; and decisions, cues and errors.

Conclusion to Phase 1:

For several years, DACUM has been effectively used by CETE in business to determine a *job analysis.* Expert workers are gathered to describe tasks involved in their specific occupation. Our DACUM Panel, though, was not comprised of expert workers from one specific occupation. Consequently, the collaborative brainstorming to determine the *duties* and *tasks* confused them. The *tasks* for a teacher using multimedia in instruction had never been defined because no specific job existed. The process was stymied by the diversity of the participants' backgrounds, and the logistics did not flow. After a half-day into the process, the panel was forced to change the question from, "What *tasks* do **you** perform when using multimedia technology?" to "What *tasks* are performed by **the teacher using multimedia in the classroom?"** As one panel participant stated at the end of the process, "I believe the initial listing of our roles in technology were off target from the focus of the project." Once the panel re-focused, the process went well. An exuberant exchange occurred between the people involved. The group dynamics was powerful and the energy-level was high and helped to set the stage to enable proper connections throughout the Project.

The *task verification* instrument was sent to over 30 people. Their responsibility was to verify that the *duties* and *tasks* generated by the DACUM panel were valid for teachers integrating multimedia into instruction and to rate the importance and difficulty of each task. Confusion surfaced here, also, because of the lack of expertise in this specific job area. In the comment section, one person wrote, "This was a very difficult form to complete. In my opinion, it was too complex, too wordy, and I'm not sure how you can use this information."

Other significant comments and thoughts were presented through the *task verification* process. There was a feeling of excitement for what was to come with the project and many were extremely pleased about the collaboration between higher education and K-12 personnel. One suggested that provisions needed to be made to address the wide range of teachers who would be in the training: pre-school - post-secondary, experienced user/non-user, specific curriculum areas, and individual teaching styles. A common theme in the comment section related to the time factor--the demand on a teacher's already too busy schedule to keep abreast of new technologies and applications. Another person advised that everything possible be done to make the multimedia technology training modules both appealing and teacher friendly. Concerns about copyright issues were also mentioned.

PHASE 2 - CURRICULUM DESIGN
Systematic Curriculum Instructional Development (SCID) Training

The Curriculum Design phase involved 24 people who were trained by the Center for Education and Training for Employment (CETE), Ohio State University, personnel to use the Systematic Curriculum Instructional Design (SCID) process. The SCID participants came from varied backgrounds: computer technicians, multimedia experts, curriculum developers, classroom teachers, teacher educators, students, administrators, university students and practitioners. Seven of the twelve participants in the DACUM Panel were also involved with SCID.

Curriculum Design Phase Components

The Curriculum Design Phase (2) outlined the overall curriculum and developed the foundation for the training program. It was comprised of four components:

1. Decisions about the training approach.
2. Development of learning objectives for each task of a group of tasks.
3. Development of job performance measures.
4. Preparation of a training plan.

Decisions about the Training Approach

Based on the information collected in Phase 1, competency-based instruction was the training approach selected by the Project Executive Committee. Competency-based training has proven successful for several reasons. It considers the individual needs and interests of the learners and it permits them to work at their own pace. The learners are provided frequent and usually positive feedback. The instruction would be based on the DACUM process results as well as the DACUM philosophy-- "expert workers can describe and define their job more accurately then anyone else." The instructional materials would be based on the skills, knowledge, and attitudes determined by the DACUM Panel and verified with the Task Verification instrument.

Development of Learning Objectives and Performance Measures

The five-day training session for SCID was held July 31-August 4, 1995. The participants developed learning objectives and performance measures for the duties/tasks generated in the DACUM chart.

The 24 newly trained SCID facilitators then formed Design Teams. At that point they entered into the Development Phase where they began developing the *Modules and Learning Guides* for the competency-based curriculum.

An additional SCID training session was held in September, 1995. Five people participated which then totaled 29 trained SCID facilitators.

Preparation of the Training Plan

The training plan centered on the competency-based curriculum approach. It was determined at this time that the curriculum package would be comprised of *modules* (duties) and *learning guides* (tasks related to the duties). The basic structure of the learning guides would identify the task, the performance required, the conditions under which it would be performed, and the criteria or standard to be met. The learning guides would be designed to be used independently by the teachers (learner).

Conclusion to Phase 2

Individual agendas had an affect on the SCID training and the group's direction. Some felt inadequate. One stated, "Since I did not have a focus until Friday, my contribution was marginal." Another person wanted to be involved in designing multimedia products, but had no framework or interest for curriculum writing. A teacher with interest in curriculum design said that she wanted to stay clear of the 'techie' stuff.

The collaboration was strengthened in phase 2. The process was an exercise in awareness and respect for each other's role and interest in multimedia. The participants were forced to think about issues collectively and support the direction of the project. A university professor in computer science stated, "It is important to develop new support service mechanisms for teachers who wish to get involved with multimedia in the classroom." He acknowledged a greater appreciation for the K-12 teachers and their needs.

The enthusiasm and motivation was positive. An interesting bond developed and evaluations indicated a sincere appreciation for the collaborative teamwork approach. The diversity that made one part of the process a challenge (DACUM), also opened the door to a refreshing professional networking system. The teamwork interaction and small group activities were considered "wonderful sharing experiences." One elementary teacher expressed that this was her most exhilarating professional experience.

The purpose of SCID was to give those involved a structured direction upon which to collectively develop print-based data which would eventually be formed into dynamic electronic-based modules.

PHASE 3 - INSTRUCTIONAL DEVELOPMENT

Module Development

The Instructional Development phase determined what was to be taught and what learning activities, materials, and instructional methods would be used in the teacher training program.

The Learning Guides, which made up the Modules, were written in the standard competency-based format provided by CETE. This allowed the designers to be free of routine decisions so they could concentrate on content.

Module Development

The DACUM chart became the guide in identifying the Modules and clustering the tasks in the Learning Guides. Each of the Modules was named by the duty and the tasks were identified in specific Learning Guides. This was referred to as the Module Scheme.

Module Scheme

Design Teams wrote the Learning Guides (LG) based on a module scheme established by the Project Executive Team. The Modules, identified alphabetically, and their Learning Guides, identified numerically, are listed below. The related tasks from the DACUM Chart are in parenthesis following the Learning Guide. Notice that some of the tasks were taken from their original duty and clustered with others.

Module A: Acquire Basic Computer Skills
LG 1 - Obtain Basic Computer Training, Perform Basic Functions & Match Software (A1-A2)
LG 2 - Manage Computer Software (A3)
LG 3 - Manage Computer Hardware (A4)
LG 4 - Utilize computer Documentation (A6)

Module B: Improve Curriculum with Multimedia
LG 1 - Curriculum Evaluation (B1-B4)
LG 2 - Review of Multimedia Software/Hardware (B5-B6)

LG 3 - Identify Learning Activities (B7)
LG 4 - Selecting Multimedia (B8-B10)
LG 5 - Modify Use of Multimedia (B11)
LG 6 - Design Multimedia (B12)
LG 7 - Evaluate Try-Outs (B13-B14)

Module C: Deliver Instruction with Multimedia
LG 1 - Select Method of Deliver (C1)
LG 2 - Setup and Verify system/Operation & Prepare Classroom Environment (C2-C4)
LG 3 - Introduce Multimedia Lesson (C5)
LG 4 - Provide Direction and Practice (C6-C9)
LG 5 - Assess Performance & Effectiveness (C10-C11)
LG 6 - Develop Alternative Plan (C12)

Module D: Utilize Support Services
LG 1 - Identify Need and Problem (D1)
LG 2 - Identify Available Support Services (D2)
LG 3 - Check Trouble-shooting Guide (D-3)
LG 4 - Consult Local & Extended Resources (D4-D5)

Module E: Enhance Teacher Communication with Multimedia
LG 1 - Share & Display Information & Projects, Publish Newsletter (E1, E2, E5, E6)
LG 2 - Prepare Administrative Reports with Multimedia (E3, E4, E11, E12)
LG 3 - Create, Retrieve, and Prepare Assignments (E7, E8, G8)
LG 4 - Retrieve and Create Student Assignment (E9-E10)

Module F: Promote Multimedia in the Classroom
LG 1 - Share or Present Experiences and Results (F1-F4)
LG 2 - Provide Assistance or Demonstrations (F5-F6)

Module G: Pursue Professional Development
LG 1 - Participate in Professional Development Activities (G1-G5)
LG 2 - Promoting Professional Development Activities (G6, G7, G9, G10)

After each learning guide was written, an overall refinement process went into affect.

Module Refinement Process

When the Learning Guides were completed, the refinement process took place. The Design Teams gathered to validate the articulation between all the Learning Guides within each specific Module. After that, naive readers were assigned to read for clarity.

Conclusion to Phase 3

The instructional development process was by far the most exhausting and challenging. Seasons changed. Summer activities had provided a relaxed environment. It was difficult to maintain the enthusiasm and motivation of the participants once their fall schedules took over. New agendas appeared and that left the work flow in chaos for a period of time. In addition to the complication of conflictive time schedules and geographic location, people were becoming bored and frustrated with the instructional development phase. When people gathered for the refinement process, though, the intensity sparked.

The value of collaboration emerged again in the refinement process. By gathering people (Design Teams) to articulate the Learning Guides (Modules), pertinent questions surfaced, concerns that needed to be addressed. With so much information about multimedia available in magazines, new books, CD-ROMs,

and on the Web, was there a "re-inventing of the wheel?" in these Learning Guides? Could the Project adapt as new information became available? Did the competency-based format allow for the creativity in the teaching environment? Would the Learning Guides address the different learning styles of the learners (teachers) and would they follow the sequencing that was intended? Would the Learning Guides address all of the computing platforms that exist in schools today?

The Design Teams used the standard competency-based format to eliminate routine decisions and to allow them the freedom to concentrate on the content. Since the competency-based curriculum design has its "own language," the Design Teams spent a lot of time concentrating on the format and deciding what went where.

PHASE 4 - TRAINING IMPLEMENTATION

Implementation

The implementation phase for the pilot testing of the project was quite informal. Pilot testing was done on an individual and a small group basis, as needed. A more formal field testing took place from December, 1996, through May, 1997. (See Part IV - Field Testing)

Pilot Testing Procedures

The training implementation phase activated the training plan developed in the design phase. Instructors who had been trained by SCID were selected and coached for the implementation process. The facilities, supplies, equipment, and other resources were secured. The emphasis in the pilot testing concentrated on a Field Reviewer's Checklist. The checklist instrument guided the user through a series of questions.

Piloting Testing Sites

Tim Kadrmas was the instructor who piloted selected modules with over 70 Valley City State University faculty in the fall of 1996. Teachers (30) from the Fargo Public School District, directed by Jodel Tiegen, and Ron Stammen as instructor of record, were involved while attending a Summer Technology Camp at Fargo South High School. Jim Schutz, Fargo middle school teacher, Project participant, and Project summer employee, piloted the Web electronic version of the Modules and Learning Guides to various individuals. Schutz and other Project personnel piloted in different phases of the Module development. Ron Stammen and Marilyn Nelson conducted the first phases of a NDSU Information Technology Services multimedia workshop for selected faculty (21).

Pilot Testing Results

North Dakota State University. The Project Director and the Assistant Project director were given an opportunity to prepare for the pilot project when they conducted the first phases of a NDSU Information Technology Services multimedia workshop for selected faculty. This workshop was the first step of a process to train 21 professors (cross-discipline, campuswide) how to utilize computerized multimedia in the classroom. Some of the basic elements of the SCID process were included in a brief, condensed-modified model developed for such sessions. This model is explained in the following narrative.

The USWEST team provided information about instructional design and models. Then the dimensions of intelligence were presented and discussed. (We learned that the Architect professors utilize these dimensions throughout their program.) Teams were organized to begin developing strategies for utilizing computerized multimedia. The sequence of steps in this model helped faculty to be efficient in terms of time and effort to produce quality results. The participants were asked to use generic instructional models until such time each had appropriate knowledge and skill to develop their own style in accord with the tools, environment, and content needed to accomplish the teaching/learning purpose and objectives of their field of study.

The first step was to provide a process for each participant to obtain a good mental fix on the educational purpose they had in mind. In other words, they had to answer the question, "Why are you doing multimedia?"

Many were focused, but many could not answer this question because they felt they were required to "do multimedia in their classroom." Consequently, two of the twenty-three participants dropped out during the second day. Then they were asked to develop a profile to identify learners' literacy characteristics and capability to assure their product fits the intended audience.

Once the educators were satisfied or comfortable describing their purpose for using multimedia in their classrooms, they had no difficulty developing a mental fix on the appropriate competencies expected of their students. They became focused on the multimedia learning module they intended to produce. They were able to describe the competency or performance outcome their efforts would illicit from students. Such competency statements helped them to determine meaning and understanding of the limits that exist regarding their learning objective. Many chose to clarify and update their thinking to develop the competency and/or performance objectives. This was done to briefly describe what you want students to do when they have completed the learning module and are ready to demonstrate the particular competency of the learning module.

This process helped the educators outline what they wanted their students to demonstrate or achieve for each target competency. In essence, they started to research their class content thoroughly to define the appropriate strategies needed to fulfill their teaching assignment. They reread standard sources, located special references, and brainstormed with peers about how to bring new information to their original proposals. In general, these experienced educators were bringing their knowledge up to date before learning about how to use multimedia technology as a teaching tool.

Some chose to develop or refine the performance enablers to further define what they were going to place in storyboard scenarios. These units of study or practice, include activities and experiences, that are designed to help (or "enable") the student to learn the target skill. They break the learning into a few major elements, making it easier and more efficient for the student to master each part. This helped determine the extent of the cognitive (or knowledge) component of the competency. They completed task analysis by working in pairs to devise or refine performance enablers for the practice component.

The workshop multimedia experts provided a series of demonstrations and hands-on exploratory exercises so these educators could determine which multimedia computer program best fit their needs. A considerable amount of time was spent learning the mechanics or functions of the software. The three-day workshop ended with instructions and discussions about how the participants would utilize their mentor (facilitator) or multimedia module instructions. They were advised to complete the following activities:

- Locate media materials that may be included as learning activities
- Previewed media materials for suitability for inclusion in their multimedia module
- Develop learning activities for each performance enabler selected for multimedia interactivity or hypertext activity
- Decide on the specific experiences they wanted students to have during the instruction provided with multimedia modules
- Carefully sequence all prepared data to analyze for any needed special instructions.

The participants produced storyboard scenarios by utilizing existing materials or developing new ones to fill in any gaps they discovered which would enhance any electronic or printed resources available to students. A storyboard is a series of sketches or pictures which visualizes each topic or sequence in instructional media to be produced; generally prepared after the research and before scripting multimedia data on the computer frames (screens). Wherever appropriate the educators would enhance their modules by doing the following:

- Devise project and laboratory exercises if these are appropriate.
- Develop the self-checks. Determine which enablers would benefit from self-checks, select the appropriate form of self-check, and write the items and model answers.
- Construct the knowledge test for the cognitive component of a selected competency, if necessary. Prepare an answer key, choose which would be on the Web, if applicable.
- Develop the final performance test and the performance standards. Some chose to have another professor in their program review and critique the standards.
- Review and check all data for any copyright compliance

The introductions were written after the multimedia modules were refined and ready to use with students. At this stage the participants knew what points to stress, and how best to interest the student. The last construction steps were as follows:

- Edit and polish the entire module.
- Review the module first for correct format and structure.
- Go through it again for grammar, usage, and style.
- Finally, check it once more for correct spelling, punctuation and capitalization.

Everyone was provided the opportunity to show their individual results and explain their efforts a month later. This helped reinforce the learning process even though most participants had not finalized their multimedia projects. The multimedia instructional modules were used in the classroom during the 1997 spring semester.

Valley City State University. The Windows 95 section in Modules was very well accepted by the Valley City State University (VCSU) faculty. Since this was done during the onset of the "laptop university" initiative, some quick training was necessary with Windows 95. They were good naive testers since many of them had absolutely no experience with Windows 95. Some of the suggestions from the VCSU faculty are listed below:

- Laptop computers don't have mouse buttons, they have track balls and click buttons. How do we relate the mouse (in the instructions) to the track ball?
- They liked the technical definitions on the side of the activity pages.
- The lack of a numbering system for the Modules/Learning Guides was frustrating for the sequential learners. They got lost.
- Those who had never used their laptop computer, had no folders. Instructions in the Learning Guides did not take this into consideration.
- An assessment check would eliminate the need for all experience levels to go through all Learning Guides.
- Use graphics to make them more user friendly.
- Watch for gender equity in graphics.

Some comments made in pilot testing by peer reviewers of the WWW site are listed below:

- Certain links had a lengthy load time. Comments on this issue were frequent. Facilitators observed frustration and impatience by the users. An example: the link where a video instructs the teacher how to implement multimedia into a student lesson. The teacher in the video read the text shown. One viewer said that she could have "read it five times while waiting for the audio to load." She also said that if she hadn't been reviewing the site for a specific purpose (pilot testing) that she would not have waited.
- Three reviewers wanted a completed lesson plan added AND a shortcut to it.
- Terms were suggested as additions to the glossary.
- Other hot links were also advised: C.I.I. (Center for Innovation in Instruction) was one. In some areas, abbreviations such as C.I.I. are being used. Some acronyms will not be known by all of the users.
- When software packages were being discussed, they advocated noting the grade levels for software packages.
- In the "How to Run Software," there was a section that required the CD in the drive and an engine installed on the HD. How is that done? The user needs to know more information before successfully completing some of the Modules.
- Other questions included: "How do you backup something?" "Why aren't the answers in the self-check bolded?"
- "The Trouble Shooting section is too scary - too technical!"
- Many passed over the links to the introductions.

Conclusion to Phase 4

The pilot testing phase was very exciting for everyone involved in the Project. There had been almost a year of planning, developing, and refining the Modules prior to Phase 4. Many meetings had taken place and the changes, changes, changes were ongoing. It was becoming laborious.

Connecting with the potential users (teachers/faculty) at this time was extremely important. Interacting with them about their concerns and issues brought the Project personnel back to reality. There were many things out of the control of the Project: the teachers' limited planning time, connectivity to the Internet, lack of support from administration, financial constraints, and technical support. All of the suggestions received in the implementation phase were taken into account and accommodated. Those who had been so tightly engaged in the Project's activities were energized by the recommendations provided.

PHASE 5 - PROGRAM EVALUATION

Introduction

The Program Evaluation Phase (5) of the Systematic Curriculum Instruction Development (SCID) process evaluated the people, process, and product components. The main goal was to collect data to make decisions on maintaining or improving the curriculum or training program. This involved gathering data on the overall instructional process, program outcomes, student follow-up, productivity of the learner, and cost-effectiveness of the phases. Analyzing and interpreting this information lead to recommendations on program improvement and finally, taking corrective actions. The evaluation of the SCID process was summarized by all of the participants during each phase and by the Project Executive Team at its conclusion. An anecdotal synopsis follows.

Reflections of SCID

Advantages

"It brought a lot of people together and gave them a structure to work with."

"The final product (so far) is a "remixing" of what came out of DACUM/SCID."

"The SCID process was valuable for planning purposes. It helped with the designing of the Learning Guides since it gave focus to what was to be accomplished in the guide. The objectives were very specific or it helped to develop specific objectives for learners."

"SCID worked well to focus us as a group. Given our varied backgrounds, we would have had great difficulty going down "one path.""

"The collaboration allowed us to grow professionally and see the value we all have in integrating technology into education."

"SCID - Systematic and organized process; allowed experts to provide information; gave us good "raw" material; gave us an approach for development; allowed us to "stay on task"; guarantees completeness."

"Provided a tool for organizing the project. Helped to break down each part of a task."

"Personally, this was a professional experience like none other. I have a certificate indicating that I am a trained SCID facilitator! Most concentrated professional development experiences don't bring together such a diverse group--that was great!"

Disadvantages

"Learning multimedia is a web-like learning experience instead of a point A to Point B situation. I think that's why the project is actually looking better new that we're talking about specifics for the WWW."

"A major disadvantage--everyone everywhere along the way tried to address everything--which led to major overkill."

"We became too concerned about trying to conform education terms to fit the SCID model."

"Greater flexibility is needed within SCID. Too much time passed, and there was so much talked about, that it was difficult to know what some tasks meant when it came time to write the guide. It would have been helpful to have had a brief clarification of each task."

"Not very flexible with respect to enabling new emerging work groups to be integrated (e.g., multimedia module development)."

"Process resulted in a lot of overlap among learning guides."

"We violated one SCID Rule! We had people with diverse backgrounds work on the SCID Learning Guides."

"Actually, SCID has never been used like this before. Typically, SCID requires all people to be experts in exactly the same job. We had experts from K-12 and universities, plus many different jobs! How this affected what we ended up with is still unclear."

"Had difficulty with defining the teaching process because each teacher has individual preferences as to how a particular subject should be taught and is free to do so. SCID is too structured to allow for individual differences."

"I think a main problem with the SCID process had as much to do with the whole process as it did with SCID. It was hard to envision the finished product at the beginning. It would have helped the process if at the SCID meetings, we would have written a performance objective for each learning guide. That way we could have kept in mind the focus of the SCID design team. This may have reduced the amount of repetition confusion."

Conclusion to Phase 5

DACUM, the job analysis process in SCID, responded to the question: "What skills do teachers need to effectively integrate multimedia into the classroom?" It wasn't necessarily an easy process because the participants came from such different backgrounds. At this juncture there are no experts in the "job" of integrating multimedia into the classroom. The DACUM Panel overcame that obstacle and generated the results necessary to continue with SCID--a DACUM Chart of Duties and Tasks.

SCID forced the participants to think about issues collectively. Independently, they may not have not have thought about some of the issues for different reasons: lack of interest, no expertise, or didn't fully understand. Those in technical-related positions simply do not have to deal with many of the problems/concerns of a elementary or secondary teacher. University faculty have different expectations about integrating multimedia in the classroom. "It was important for us to get together to see what each others world is really like," stated a university professor. SCID was helpful to focus the large group of participants who were from a variety of backgrounds. It provided a framework around which to organize the Project and ensured completeness to the process. The disadvantages mainly centered around the large number of people with diverse backgrounds who were involved with SCID, time factors, SCID being too inflexible (*although coached that flexibility was the innovative part of the project*) to be used with education, and too much overlap between Learning Guides. All agreed the process should be used in a similar project.

Ronald M. Stammen completed a two-year, USWEST Foundation funded project ($287,000) which focused on utilization of multimedia for K-12 teachers and professors. He is also involved as instructor-of-record and evaluator of USWEST/NDEA laptops initiative for 101 teachers across North Dakota, and Cass County School Improvement Coordinator for technology networking Professional Development and Curriculum Teams. He assisted Denny Van Berkum with basic team-based cooperative-on-line instruction for Ed Law. He was co-founder and current chair of SENDIT a statewide K-12 computer-mediated host service.

Collaboratively-Created Multimedia Modules for Teachers

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  - Introduction
  - Using Commercial Multimedia Software
  - Creating Your Own Multimedia Material
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  - Assessment of Student Authored Projects
  - Designing Your Own Web Site

- Preparing to Use Multimedia
  - Introduction
  - Using Computer Hardware
  - Basic Computer Functions
  - Using Computer Software

- Presenting Multimedia
  - Introduction
  - Kid Pix 2
  - Hyperstudio

- Producing Multimedia
  - Introduction
  - Sample Lesson

- Promoting Multimedia
  - Introduction
  - How to Share Your Experiences

- Activities for Professional Development

- Help
  - Troubleshooting Checklist
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