CHAPTER 3 - DEVELOPMENTAL RESEARCH METHODOLOGY

This chapter describes the methodology used to document the development of a teaching model for instructional design, including the unit of analysis and participants, instructional approach, data sources and collection procedures, and data analysis procedures for each case.

The substance of this study deals with a means to teach instructional design based on our view of instructional design and our view of teaching. The form of the inquiry is a multi-case approach used to describe how the model or instructional approach was used over time. Yin (1994) suggests that research questions (or objectives in this study), have both substance (i.e., What is this study about?) and form (i.e., Am I asking a "who," "what," "where," "why" or "how" question). A "how" research inquiry deals with "operational links needing to be traced over time, rather than mere frequencies or incidence" (Yin, 1994, p. 6).

The case study is used to understand complex social phenomena (Yin, 1994), to "describe complex situations that consist of a myriad of critical contextual variables as well as process complexities" (Richey & Nelson, 1996, p. 1222). The case covers the contextual conditions inherent in teaching and relies on multiple sources of evidence to describe the same phenomena from a reflexive teaching approach. Such an approach requires that data collection and data analysis methods be carefully described to reveal clearly how data was collected and analyzed so findings could be traced back by someone else through the data reduction to the original data.

Unit of Analysis & Participants

Unit of Analysis

The unit of analysis in this research is a case, defined by each delivery of the ID course across 6 cases (see Figure 4). The documentation of a teaching model to support student and instructor learning of instructional design begins with a description of my participation in the course as a student during the 1992 Fall semester. This participation allowed me to directly experience the course and reflect on the course's requirements as well as my performance. This subsequent reflection triggered thinking on ways to develop supporting materials to assist students with the course.

The teaching model for the course, in which I participated as a co-instructor, is described, implemented, and evaluated over six cases from Summer I, 1994 through Spring, 1998. Case 1 was a 5-week summer course with nine contact hours per week. Cases 2-5 were 15-week fall semesters, which met for three contact hours per week. Case 6 involved in-service K-12 teachers from a joint school district/university-sponsored master's program, during a 15-week spring semester, which met off-campus for 3 hours once per week.

Case	Course Season	Students	Course configuration
1	Summer 1994	13	Campus, 5 weeks, 3 meetings/week, each 3 hr.
2	Fall 1994	22	Campus, 15 weeks, 1 meeting/week, each 3 hr.
3	Fall 1995	20	Campus, 15 weeks, 1 meeting/week, each 3 hr.
4	Fall 1996	19	Campus, 15 weeks, 1 meeting/week, each 3 hr.
5	Fall 1997	16	Campus, 15 weeks, 1 meeting/week, each 3 hr.
6	Spring 1998	23	Off-campus, 15 weeks, 1 meeting/week, each 3 hr.

Figure 4. Instructional design course across six cases.

Participants

Participants across the six cases included 113 students and two instructors in EDCI 5164, Principles of Instructional Design, a master's level course in Virginia Tech's College of Human Resources and Education.

Students. Students were characterized by their instructional design experience, teaching experience, educational level of interest, and content focus (see Figure 5). This information was acquired by self-report during the course. Fifteen students had formal ID experience, while 98 had none. Students' instructional design experience ranged from a lack of any formal instruction in instructional design to those who had developed media materials in school, corporate, or governmental settings. Participants possessed a wide range of instructional technology interests and competencies from minimal (e.g., beginning word processing skills) to highly experienced (e.g., managing instructional technology support for public school districts).

Of the 113 students, 73 had teaching experience, while 40 did not. Educational levels of interest included 18 elementary school, 15 middle school, 26 high school, 6 with an overall K-12 interest, 29 college, and 19 training. The largest content area focus of the participants included science and technology (19), followed by language (17), computing (14), and special education (12). The participants' ID experience, teaching experience, educational interest level, and content focus for each Case are summarized in Appendix A.

Instructors. The professor of record for the six cases under study was Dr. Susan G. Magliaro, an associate professor of educational psychology in Virginia Tech's College of Human Resources and Education. Her professional area of interests included instructional design, educational psychology and professional development. Dr. Magliaro has teaching certifications in learning and behavioral disorders from The Ohio State University, and taught in public schools for nine years, in both general and special education settings. She has developed two off-campus master's programs for K-12 teachers and has conducted numerous workshops for teachers. She has taught the ID course for ten years and has written several papers related to the ID process (e. g., Nelson, Magliaro, & Sherman, 1988; Burton, Moore & Magliaro, 1998), an instructional design text (Shambaugh & Magliaro, 1997), and instructor's guide (Magliaro & Shambaugh, 1997).

Instructional Design Experience		Teaching Experience	
Yes = 15	None = 98	Yes = 73	None = 40

Educational Level of Interest	Content Focus
Elementary grades = 18 Middle grades = 15 High school = 26 K-12 = 6 College = 29 Training = 19	Business Education = 1 Computing = 14 Consumer fields = 10 Health & Physical Education = 9 Language = 17 Library Mathematics = 8 Music Education = 5 Reading = 4 Science, technology = 19 Social studies, geography, history = 9 Special Education = 12 Training = 4

Figure 5. Participants' instructional design experience, teaching experience, educational level of interest, content focus.

My professional instructional design experiences included six years of experience developing customized audiovisual and written task training, safety, and orientation materials for corporate clients, and 15 years of experience of audio/video writing and production to support a university's public information needs. Formal instructional design experiences included an undergraduate course in structured systems analysis and two graduate courses in instructional design. As a student in the master's level ID course (1992), I began thinking and writing about ways to assist students in the understanding of ID processes and managing ID course requirements. From 1994 through 1998, I assisted Dr. Magliaro with the design of the course, provided some instructional support, and developed activities and three versions of a student guide, which evolved into a published instructional design textbook and instructor's guide (Shambaugh & Magliaro, 1997; Magliaro & Shambaugh, 1997). Ongoing research on ways to support ID learning within this master's level course was reported with Dr. Magliaro at educational research conferences since 1995. My research interests have also included the use of visuals for both teachers and learners (i.e., Shambaugh, 1994-October), the development of cognitive artifacts, both print and electronic (i.e., Shambaugh, 1996-February, 1996-April, 1998-October, 1998-December), and the structure of graduate programs (Shambaugh, 1998-April).

Instructional Approach for the Cases.

The instructional approach for the course stressed co-participation, dialogue, and responsivity to student needs (see Figure 6). We believed active involvement in instructional design was necessary by both students and instructors (Shambaugh & Magliaro, 1995-March). "In essence, this class is a co-participatory learning experience. We hope to learn as much from you and the process as you learn from us and the process" (Summer, 1994 syllabus; see Appendix B-1). More specifically, co-participation was enacted through classroom activities (e.g., presentations, groups, discussion), learning tasks (e.g., ID project), electronic mail, and personal conferences.

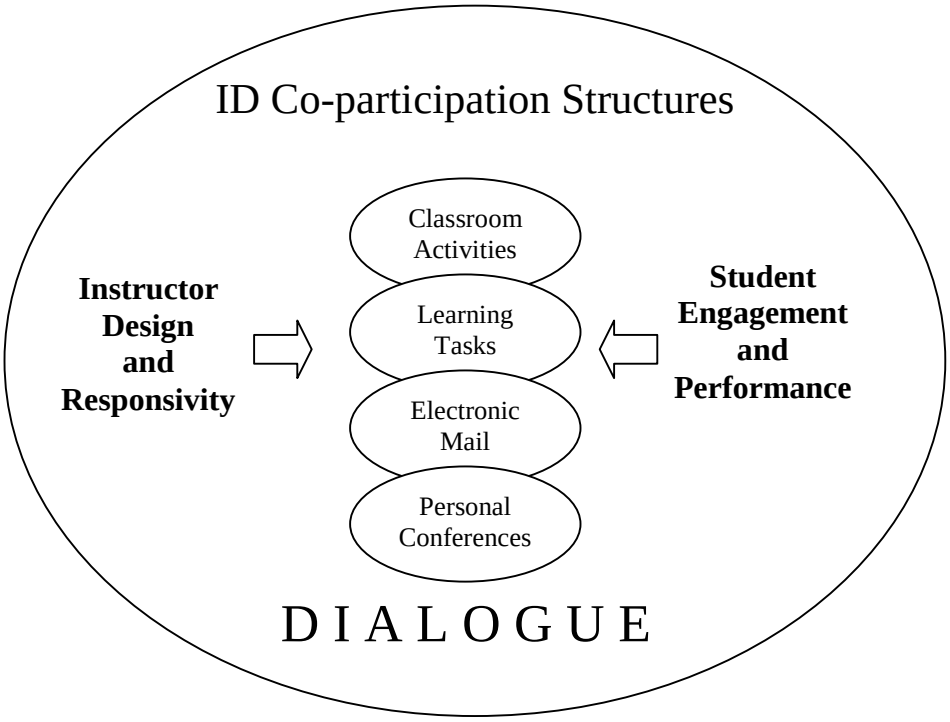


Figure 6. Instructional approach

The first co-participatory structure, classroom activities, included presentations by instructors, usually through mini-lectures lasting 10-30 minutes in length dealing with ID process components (i.e., analysis, design, evaluation). Students also made formal presentations through teaching demonstrations, as well as in-class activities. Student groups, composed of 2-6 students, worked together in class on structured learning tasks and reported their findings back to the class. The principal learning task was an instructional design project, which provided students a means to experience and implement the ID process on an instructional problem of their choice. In these projects students would make decisions regarding learners, content, and contextual realities within instructional design components (e.g., needs assessment, content sequencing, assessment, teaching approaches, media, program evaluation). Supporting tasks included learning principles, personal ID models, and a self-evaluation. Co-participation also included personal conferences and electronic mail. Personal conferences were added with Case 2 (Fall, 1994), while electronic

mail was formally implemented as a participation structure beginning with Case 3 (Fall, 1995), as students across the campus routinely began to use electronic mail.

Dialogue for students involved student engagement including reading assigned articles and text chapters and participating in class activities; and performance on learning tasks, such as deciding on a project, submitting draft ID components and supporting tasks, revising, reflecting on learning, and providing feedback to the instructors. Dialogue for instructors can be characterized by collaborative course design decisions, interacting together and with students within participation structures, and responding to learner needs. Instructor responsivity to learners involved a range of assistance, including the use of modeling, contingency management, feeding-back, questioning, instructing, structuring, and reflecting (Shambaugh & Magliaro, 1995; Tharp & Gallimore, 1988). Figure 7 identifies the different means of assistance for each of the course activities. The ID project and the student guide (later adopted and referred to as the "text" in Cases 5-6) included all of the seven categories. Instructors practiced many features of the ID process, such as formative evaluation of the course and instructional materials through end-of-the class exit slips and course evaluations. The instructors modeled risk-taking by involving themselves in class discussions, group activities, and sharing their own personal models. For the instructors, the course was another enactment of an instructional design-in-progress. While students were transferring ID process understanding to their ID projects, the instructors were continually field-testing the instructional design for the course. Thus, instructors were modeling the content to be taught.

Responsivity ⇨ Course Activities⇩	Modeling	Contingency Management	Feeding -back	Instructing	Questioning	Cognitive Structuring	Reflecting
Class sessions	X	X	X	X	X	X	
I.D. model	X	X	X		X	X	X
ID project	X	X	X	X	X	X	X
Conference	X	X	X		X	X	X
Teaching presentation	X	X	X	X	X	X	
Self-evaluation		X	X		X		X
Text/Handouts	X			X		X	
Student guide	X	X	X	X	X	X	X

Note: Shaded blocks denote an activity that included all categories of assistance.

Figure 7. Responsivity to learner needs (Shambaugh & Magliaro, 1995; Tharp & Gallimore, 1988).

Contingency management included encouragement to ask questions, become involved, and revise written work. Timely feedback was provided on student work, exit slips, and questions from class. Responsivity during instruction meant listening or responding to what students said or wrote, prompting for elaboration in classroom discussion or written work, and making shifts in class presentations, activities, and grouping decisions. Questioning was conducted during class, but particularly on written work to prompt students to think, clarify, and revise, if necessary.

Cognitive structuring, meanwhile, refers to "an organizing structure that evaluates, groups, and sequences perception, memory, and action" (Tharp & Gallimore, 1988, p. 65). Type I cognitive structures, those that organize content and provide explanations, include presentation visuals, project outline, learning task sheets, and student guide. The student guide, for example, restructured content through an overview of ID process components, conceptual tools (e.g., taxonomies) and procedural tools (e.g., intent statement, task analysis), self-assessment, and project management guidelines. Type II structures, those that provide cognitive activity, included guidelines for design decisions such as "The choice of assessments depends on one's assessment purpose," or "One's design decisions should resonate with one's overall instructional mission." In addition, cognitive structuring does not originate from the instructor alone. In the ID model task the instructors assist learners to develop their own cognitive structures for instructional design.

Finally, "reflecting" on learning task performance and overall course performance was added by us (Shambaugh & Magliaro, 1995) as a distinctive form of performance support and included the personal ID model task, draft project submissions, conference conversations, a self-evaluation task, and questions in the student guide.

Course sequence. The course sequence, as it evolved over six cases, began with an examination of personal (or institutional) learning beliefs and a survey of ID tools (e.g., learning theories, ID models), followed by an overview of instructional design's analysis, design, and evaluation components (see Figure 8). "Learning Beliefs" and "Design Tools" were a distinctive feature of this sequence over other ID models (e.g., Dick & Carey, 1996), which typically began with a needs assessment. Implementation issues were addressed partly through a discussion of formative program evaluation and the "Prototype Lesson" phases of our ID sequence.

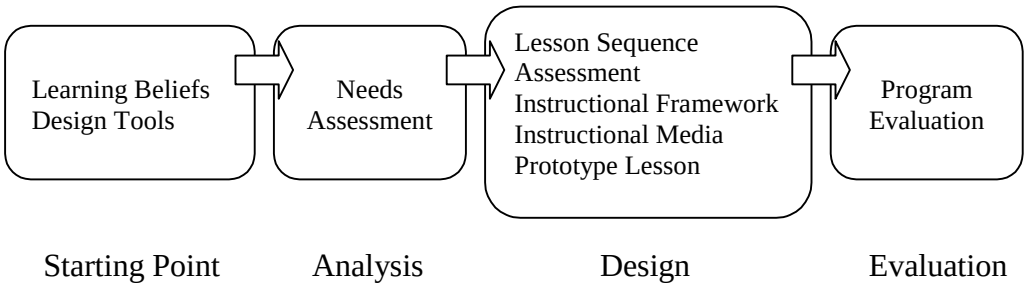


Figure 8. Instructional design course sequence.

The major learning activity centered around a student's ID project which addressed an instructional problem of the student's choice. ID project components were structured by task

sheets, which itemized sub-components for each ID phase and performance criteria for these sub-tasks. Ongoing assessment for each student, as well as formative evaluation for the course, consisted of notations on the task sheet's criteria, written and/or email feedback on learning tasks, end-of-each-class feedback (i.e., "exit slips") and personal conversations. Individual or group conferences (Case 2-6) were conducted twice (once in Case 6) during the course to find out more about students' interests and backgrounds, discuss learning tasks, and assess and structure, if needed, the relative progress toward project completion. Assessment of student learning involved the examination of draft ID project components, the completed project, personal ID models, and a self-evaluation. Evaluation of the course was obtained from students' perceptions of the course from a University course evaluation survey, in-class surveys, self-evaluation task, and conference interviews.

Data Sources and Collection Procedures

This section describes data sources and collection procedures that document the design decisions for each case, based on the teaching model; the implementation of these design decisions through instruction; and evaluation of the teaching model over the six cases in terms of student performance on learning tasks and instructor responsivity to learner needs. The data sources for each of these developmental stages are listed in Figure 9, and availability of data across the six cases is identified in Figure 12.

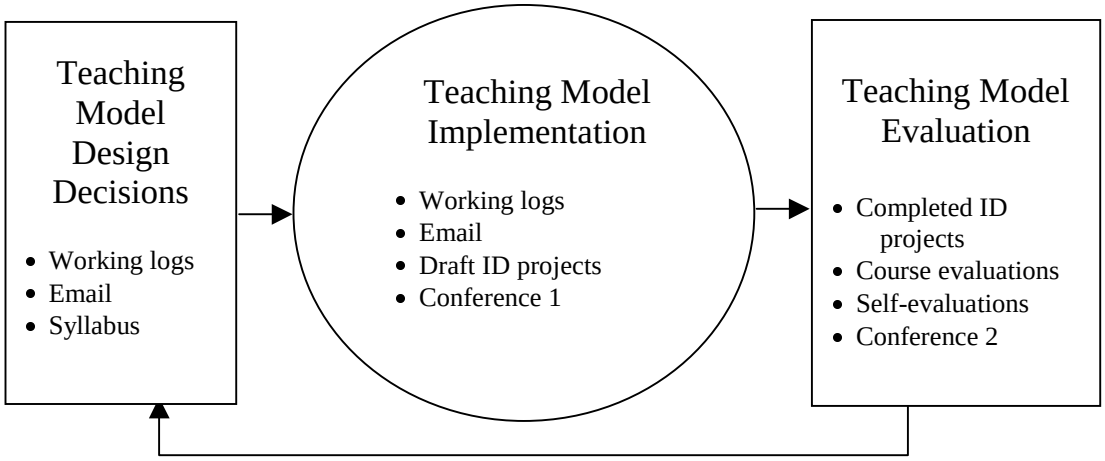


Figure 9. Data sources for teaching model's design and development components.

These case studies include multiple data sources: documents (e.g., learning tasks, projects, questionnaires, course evaluations), structured interviews, and observations (i.e., working log notes). Multiple sources facilitate the development of what Yin (1994) calls converging lines of inquiry, a means of data triangulation in which several different sources of information corroborate the same phenomenon. Descriptions of data sources are also referenced in Appendix C. Data sources and collection procedures are now described, according to the above framework.

Data Sources For "Teaching Model Design Decisions"

Working logs. Journals, or working logs (WL), documented my thinking and involvement in the ID course, including class presentations, learning tasks, student guide content, and teaching model representations. Two working logs (S1-S2) recorded my experiences as a student in the course (Fall, 1992), while 16 working logs (February, 1994 – May, 1998) documented my involvement as co-instructor in the ID course. An inventory of working logs for each case is found in Appendix D.

Email. Beginning with Case 3, electronic mail between instructors recorded dialogue on details for the next delivery of the ID course, including course sequence, learning tasks, and instructional materials. Email for Cases 1-2 (Summer and Fall, 1994) was not actively used by a majority of students in the course and was not archived. Email for Cases 3-6 was archived on diskettes.

Syllabus. A syllabus recorded major design decisions for each of the six cases, including course purpose, instructors, instructional materials, assessment rubric, and course sequence (see Appendix B). Instructional materials included required and/or supplementary texts, readings, learning-task sheets, mini-lectures, class activities, and feedback forms. Beginning with Case 3 (Fall, 1995) a Listserv was added. A web site was added beginning with Case 5 (Fall, 1997) and included pages for the syllabus, class schedule, design activities, learning task sheets, course guidelines (e.g., "How to use the text"), and links to other web sites.

Data Sources for "Teaching Model Implementation"

Working logs. Whenever possible during class, I recorded student comments and made observations of class activities and student/instructor performance. Outside of class working logs recorded my perceptions on what occurred in class, summaries of weekly submissions of student work, and notes from weekly instructor meetings.

Email. Email was another source of instructor dialogue on weekly shifts in instruction and responding to student needs. Beginning with Case 3 (Fall, 1995), a course Listserv was used by the instructors to submit weekly class agendas, reminders, additions to class discussions, and print and Internet resources. Some students used the Listserv or personalized email to ask questions. Personal email between Dr. Magliaro and students was not available for this analysis. Email records were systematically kept for Cases 3-6 and stored on diskettes.

Student guide questions. Questions at the end of each chapter of the student guide in Case 1 served as self-assessment for readers about their understanding and concerns at this point in the course, and were used in this study, as no copies of project drafts were available for analysis. Each chapter corresponded to a phase of the ID process. Case 1 questions included the following four questions at the end of each chapter: Do you have questions about this phase of the ID process?, What concerns do you have at this point in the class, Do you have any insights to share, and What made sense or could be made clearer?

Draft ID projects. The ID project consisted of a student-chosen and negotiated instructional problem. Examples of project topics included summer science activities for children, success strategies for college students, using the World Wide Web to explore local history, and a summer workshop for high school choral students. Participants would be encouraged to select an instructional problem in which they had some content knowledge, so they could concentrate on learning the ID process, and one that could be addressed over the

length of the course. Draft versions of required components are listed in Figure 10, along with a brief purpose statement. Students were provided with task sheets, which outlined major sub-tasks for that component, and beginning with Case 3, performance criteria for each sub-task were added to the task sheet. These criteria included the timely submission of a design task and a set of ratings (on a scale of 1-5) of their performance for each task. The criteria for each component are found in Appendix E. The instructors commented on weekly submissions of ID project components, which were returned to the students the following week. Whenever possible, weekly versions of student work were photocopied and filed. No draft components were photocopied for analysis in Case 1, because of the tight turnaround of providing student feedback over the summer session (3-3 hour sessions/week). Only the Mission Statement task was on hand for analysis in Case 2, as the two instructors had not yet worked out a system for mutually providing feedback and photocopying weekly submissions before the next class.

ID Project Component	Learning purpose
Mission Statement (implemented in Case 2)	Summarize learning beliefs.
Intent Statement	Overview of proposed ID project.
Needs Assessment	Learn more about an instructional problem and determine project goals. Understand the need to collect data to support decision-making.
Sequence of Instruction	Determine order, rationale for instruction.
Assessment Plan	Matching assessment purpose with assessment tools.
Instructional Framework	Determine instructional strategies and approaches.
Instructional Media Plan	Propose how instructional media supports learning.
Teaching Demonstration	Demonstrate instructional approach for key portion of ID project, and as a participant gain experience on enacting it.
Prototype of Key “Lesson”	Lay out details of important activity and lesson prototyping design features.
Program Evaluation Plan	Propose formative and summative evaluation plan.

Figure 10. Draft ID project components.

Conference 1. Student-teacher conferences began with Case 2 (Fall, 1994). The first of two conferences was scheduled at week 5 and consisted of a 60-minute (30 minutes in Case 2) meeting to discuss students’ work, including the mission statement, preliminary ID models, project choice, and needs assessment strategy. With students’ permission these sessions were audio taped and were available for analysis in Cases 3-6. Figure 12 records the number of interviews available for analysis in Cases 3-6. For Case 6, one on-campus, day-long visit from the off-campus K-12 teachers was scheduled for the participants during weeks 5-7 of the course. During this day-long visit, a personal conference provided these teachers to summarize their

needs assessment efforts and findings, respond to teacher concerns on their projects, and hear more about their teaching experiences. Eight conference interviews were obtained consisting of single interviews or with groups of teachers.

Data Sources for "Teaching Model Evaluation"

Completed ID projects. The 50 projects available for analysis are listed in Appendix F. Figure 12 records the number of projects available for analysis in each case. The 50 projects analyzed were those projects retained to show future participants. These projects represent a range of projects with exemplar features and those volunteered form participants to share with others. The required components for the final project are listed below and in more detail in Appendix G. The Mission Statement was a new component beginning with Case 2. The components, "Teaching Models" and "Sample Lesson," were re-titled "Instructional Framework" and "Prototype Lesson," beginning with Case 4.

0. Table of contents
1. Mission statement of beliefs about learning/learners/instruction
2. Project idea or intent statement
3. Needs assessment
4. Content/Lesson outline
5. Assessment plan
6. Instructional framework
7. Instructional media
8. Prototype lesson
9. Program evaluation
10. References
11. Appendices

Course evaluations. The course evaluation included some or all of the following: OPSCAN questions (Cases 1-6), supplementary questions (Cases 1-6), or a PMI task (Cases 5-6). The OPSCAN was an optical scanning form, which included the University's standardized set of Likert-scale questions to record student perceptions of instruction, instructors. and materials (see Appendix H). Thirteen questions from this survey were used in this study (see Figure 11). Questions 11, 12, and 13, which asked students to identify the type of course (e.g., required course in my major, free elective), academic level, and expected grade were not used. Students were asked to rate the instructor (7 questions each on a scale of poor, fair, good, excellent), course (2 questions on a scale of poor, fair, good, excellent; 1 question on time and effort required on a scale of less-than-average, average, more-than average), and gains in knowledge, thinking and problem solving ability, and appreciation of subject and discipline (3 questions on a scale of less-than-average, average, more-than average). The OPSCAN was distributed to students during the final class and returned to a unit secretary by a designated student volunteer.

RATING INSTRUCTOR

1. Apparent knowledge of subject matter.	P	F	G	E
2. Success in communicating or explaining subject matter.	P	F	G	E
3. Degree to which subject matter was made stimulating or relevant.	P	F	G	E
4. Concern and respect for students as individuals.	P	F	G	E
5. Fairness in assigning grades.	P	F	G	E
6. Administration of the class and organization of materials.	P	F	G	E
7. Overall rating of this instructor.	P	F	G	E

RATING COURSE

8. Adequacy of textbook and other study materials.	P	F	G	E
9. Educational value of out-of-class assignments.	P	F	G	E

10. Time and effort required.
LESS THAN AVERAGE
AVERAGE
MORE THAN AVERAGE

RATING STUDENT GAINS

14. I would rate my gains in this course compared with similar courses as follows:

a. Knowledge of principles, theories, techniques.
LESS THAN AVERAGE
AVERAGE
MORE THAN AVERAGE

b. Logical thinking and problem solving ability.
LESS THAN AVERAGE
AVERAGE
MORE THAN AVERAGE

c. Appreciation of subject matter and discipline field.
LESS THAN AVERAGE
AVERAGE
MORE THAN AVERAGE

Figure 11. OPSCAN questions used in this study.

Students also completed a set of supplementary questions, which asked them to rate and/or comment on specific learning tasks and instructional materials not addressed by the standardized questions. The supplementary questions used for Cases 1-6 are recorded in Appendix I.

- Case 1 supplementary questions consisted of 11 Likert-scale questions (on a scale of 1 for "poor" to 5 for "excellent"), which asked students to rate the student guide, textbook, organization of course content, learning principles task, preliminary ID model, revised ID model, mid-term exam, project, teaching model presentations, and self-evaluation task. Space was also provided space for comments. A twelfth question asked for additional feedback.
- Case 2 supplementary questions consisted of six questions at the end of the student guide and asked about how students felt about self assessment, what they learned about themselves, what learning strategies they learned, how their learning beliefs changed, what were critical

moments in the course, and if ID could be taught and learned. Responses to these questions were handed in at the end of the course.

- Cases 3, 4, 6 supplementary questions consisted of 20 Likert-scale questions (on a scale of 1 for "poor" to 5 for "excellent") on features of the course and were distributed and collected during the final class session (see Appendix I).
- Case 5 supplementary questions on student reactions to the instructional text were distributed to students during the course (e.g., "What is the most important idea for you in this chapter?" "What design tools did you find most useful in this chapter?"). Customized questions for each text chapter were handed out during the week in which the chapter was assigned and their responses collected the following class meeting. A total of 46 questions were submitted during the semester. Questions related to this study were identified from each chapter and are listed in Appendix I.

In Cases 4-6 a supplement to the course evaluation was a "PMI" task, which was administered during the last class and asked students to record the "Plusses" for the course, the "Minuses," and "Interesting things to do next time" (i.e., the next delivery of the course). This one-page task was collected by the instructors at the end of the class.

Self-evaluations. Students' self evaluation of their learning in Cases 1-3 was gathered through a written task, and for Cases 4-5, was conducted during the final class meeting. A self-evaluation for Case 6 was not available.

- In Case 1 the self- evaluation task asked students to summarize what they learned in the course, what they would like to learn next, and comment on their experiences with the course.
- In Case 2 students were asked to report major concepts and processes learned in the course, personal designing strengths and weaknesses, and instructional improvements.
- In Case 3 students were asked to summarize "the major concepts/processes" learned in the course, "your particular strengths in ID skills and knowledge," and "areas of concern and suggestions" for improvement.
- In Cases 4-5 the self-evaluation task was conducted during the final class session, and students were asked to respond to three questions: (1) "How do you feel now?" (2) "What would you do differently?" and (3) "Next steps? (with the project or other)." Student responses were recorded during class in a Working Log entry.
- The self-evaluation was not available in Case 6.

Conference 2. A second student-teacher conference was conducted in Cases 2-5 and consisted of a 60-minute (30 minutes in C2) meeting at the end of the course to address student questions and provide instructor feedback on projects. Beginning with Case 3, the purpose of the second conference changed from an end-of-the-course self-evaluation to another opportunity for feedback, as the second conference was moved up in the schedule. Beginning with Case 3 the conferences were audio-taped with the student's permission. A second conference was not held in Case 6, as the participants were K-12 teachers off-campus and only one conference was scheduled. Figure 12 records the number of interviews available for analysis in each case.

Data sources ⇩	C1 S94	C2 F94	C3 F95	C4 F96	C5 F97	C6 S98
Teaching Model Design Decisions						
Working log #	1-3	4-5	6-9	10-13	14-15	15-16
Email			X	X	X	X
Syllabus	X	X	X	X	X	X
Teaching Model Implementation						
Working log #	1-3	4-5	6-9	10-13	14-15	15-16
Email			X	X	X	X
Draft ID project components	Guide Qs (11)	Mission Statement	X	X	X	X
Conference1 tapes		Notes 9	17	24	15	8
Teaching Model Evaluation						
ID Projects	6	4	9	5	13	13
OPSCAN	X	X	X	X	X	X
Supplementary questions	X	X	X	X		X
P-M-I Task				X	X	X
Self Evaluation	Written	Written	Written	Working Log	Working Log	
Conference2 tapes		22(notes)	19	19	12	

Figure 12. Availability of data across cases.

Data Analysis

This section describes the data analysis framework for the study and specific data analysis procedures for each case.

Data Analysis Framework

Design and development cycle. To comprehensively document the teaching model, Richey and Nelson's (1996) framework for conducting a developmental research study was adopted. Within this framework the "design and development process" was used to track the design decisions, implementation, and evaluation of the teaching model. A generic view of this process depicts a cyclic examination of an instructional problem through a needs assessment (i.e., analysis), design of features to address the problem, implementation of the design, and evaluation of the design (Reiser & Dick, 1996), which influences subsequent design efforts (see Figure 13).

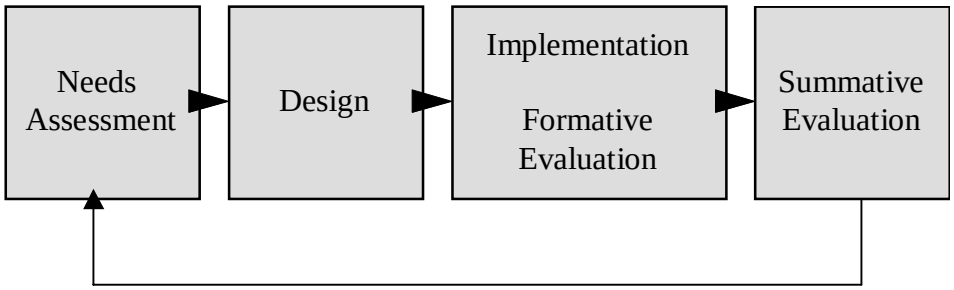


Figure 13. Generic design and development cycle.

Discussions for a new delivery of the ID course were usually held several weeks before the course began and typically involved both needs assessment and design components (see Figure 14). We would recall our previous experiences with the ID course, including what students said about the course and how they performed on learning tasks. We would also call upon our pedagogical knowledge (Shulman, 1986) of teaching instructional design to implement our approach (i.e., teaching model), including the choice and development of learning tasks, activities, and materials, and the sequence of instruction for the upcoming course. This pedagogical knowledge would also be influenced by reading, reflection, and research documenting our efforts.

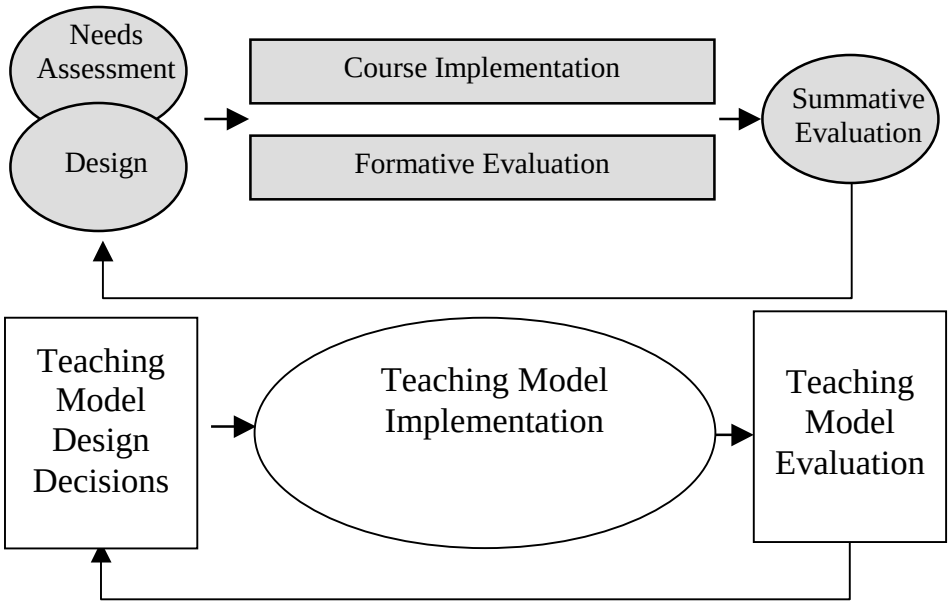
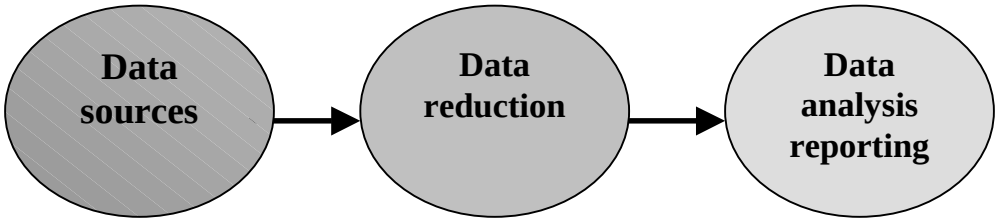


Figure 14. Modified design and development cycle used in the ID course.

This modified design and development cycle was used to document the development of the teaching model by describing (1) the design decisions for the next delivery of the course, (2) the implementation of the teaching model, and (3) evaluation of the model.

Data analysis overview. Data were analyzed using the qualitative techniques of Miles and Huberman (1994), which consisted of data reduction from data sources and display of this reduced data in "frames" that enabled conclusions to be drawn. Examples of these frames included tables or worksheets, and are summarized in Appendix J. The data analysis sequence is visualized in Figure 15, in which data is collected, reduced into frames, and reported in Chapter 4. The data reduction documents were kept in 3-ring Data Reduction Notebooks (DRN), each divided by data sources. This strategy served to separate the data from the report and provides a means to organize the data and track the analysis sequence from data source to data reduction to data reporting.



Data collection

- 4-file bins of student work
  117 audio tapes
  16 working logs
  50 completed projects

Data reduction frames

- 6 data reduction notebooks (DRN)

Data findings using the design and development cycle

- Data analysis findings (Chapter 4)

Figure 15. Data analysis organization.

Data analysis reporting. For each of the six cases analyzed in Chapter 4, the documentation of the teaching model was reported in terms of the design and development cycle: design decisions, implementation, and evaluation (see Figure 16). The needs assessment and subsequent design decisions, based on the teaching model, were reported by describing (a) participants, (b) learning tasks, (c) course sequence, (d) assessment, and (e) instructional materials. Analysis of the implementation of the model for each case was reported by describing student performance and responses to instruction and instructor's assistance during (a) ID context activities, (b) ID process instruction, and (c) draft ID projects. Summative evaluation of the teaching model was reported on the basis of summarizing (a) student performance on the ID project, (b) students' self-perceptions of their learning, and (c) instructor responsivity to student needs. Chapter 4 concludes with a section that summarizes changes in the design, implementation, and evaluation of the model over the six cases.

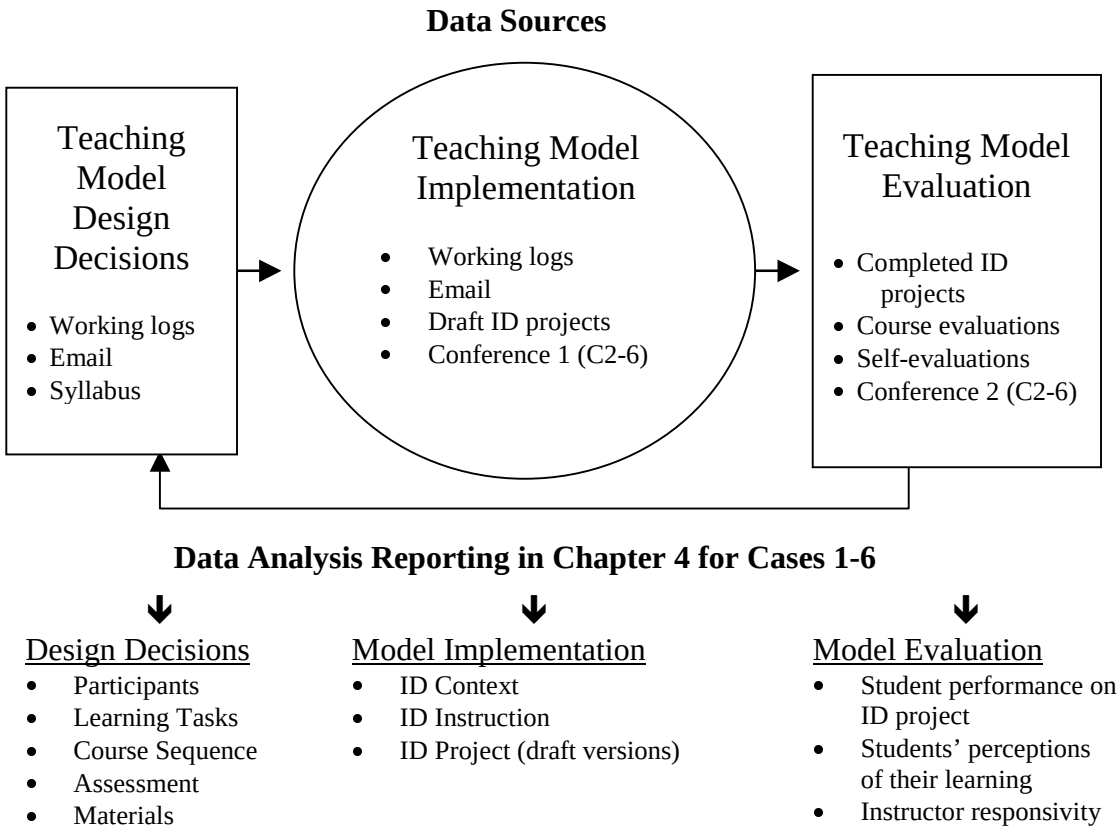


Figure 16. Data sources and data analysis reporting for teaching model development.

Data Analysis Procedures for C1 – C6

The following section describes specific data analysis procedures for each of the data sources across the six cases. All data reduction documents were inserted into their respective data reduction notebook (DRN) and their contents are listed in Appendix J.

Case 1 (Summer, 1994)

Working logs. Notes from Working logs 1-3 on course design decisions were transcribed and grouped under categories of course sequence, learning tasks, instructional materials, and assessment rubric. Notes on what occurred during each class were grouped under the categories of ID context, ID instruction, and ID project. References to working log entries are denoted by a page number in brackets, such as [1263].

Syllabus. The syllabi for Summer 1993 and Summer 1994 (Case 1) were compared for differences in course sequence, learning tasks, instructional materials, and assessment rubric, and recorded on a separate document using the above headings.

Student guide questions. Students submitted their responses to each set of questions at the end of each chapter of the student guide. Each chapter corresponded to a particular ID phase.

Submissions were photocopied, responses for each of the four questions were aggregated, aggregated responses were coded for topic of concern, and coded topics were listed.

ID projects. ID projects were analyzed for (a) completeness, (b) consistency of learning beliefs across design components, and (c) coherence of design components. These three categories were listed in a table with a fourth column for comments. In terms of completeness, each project was examined for inclusion of required components. A “yes” or “no” with missing components, were recorded in column one. For consistency, important ideas (e.g., assisting learners, skill proficiency, working together, problem solving, multiple instructional approaches) were identified from the Project Intent Statement and recorded in column 2. The ID project was reviewed to note whether or not these ideas were explicitly addressed in the projects. For example, if a student wrote about the importance of students "working together," I looked for this feature in either the instructional approach, sequence of activities, or prototype lesson. A checkmark beside the list of ideas noted whether or not an item was reflected in writing. If the project recorded over half of the ideas addressed, I recorded a “yes” in column 2. If the project recorded less than half of the ideas being addressed, then I recorded a “no” in column 2. This 50% rule was chosen as a "liberal" cut-off point, as being consistent over all identified ideas for students experiencing the ID process for the first time was judged by me as overly stringent. For coherence, notations were entered in column 3 in terms of how each design component was represented. A judgment was made whether or not these design components appropriately supported each other, such as assessment tools supported an instructional approach. A lack of coherence between components was noted in column 3. A more stringent judgment was made with coherence than with consistency as there were fewer items of coherence than items of consistency. Any lack of coherence resulted in a “no” recorded in column 3. The comment column summarized distinguishing characteristics of each project (i.e., exemplars of a particular component, innovation, or shortcomings).

Course evaluation: OPSCAN. Student perceptions of instruction (see Appendix G) on 14 Likert-scale questions were tabulated by the University’s Office of Measurement and Research Services in terms of mean frequency. Mean score responses and number of respondents were recorded in a worksheet (see Appendix K-1). The scanning forms also provided space for student comments, which were transcribed and the responses clustered into categories of instruction, instructional materials, and learning tasks, and recorded on a worksheet.

Course evaluation: Supplementary questions. Twelve questions asked students to rate and comment on the organization of the course, instructional materials, and learning tasks. Questions 1-11 used Likert-scale responses (1 being “poor” to 5 being “excellent”), which were tabulated and summarized as mean scores (Appendix K-1). Responses to Question 12, an open-ended question asking for additional comments, were transcribed and recorded on a worksheet.

Self-evaluation. Responses to three questions, What students learned in the course?, What students would like to learn next?, and comments on course experiences were summarized in a table including categories of instruction, materials, or learning tasks, and recorded on a worksheet.

ID models. Student representations of their planning/design processes (i.e., their personal ID models) were used to describe one of the learning activities that helped to establish the context for ID instruction. Photocopies of student’s preliminary ID models, consisting of a visual and a narrative, were on file. Working logs contained my observations from student sharing of

these models in class. For each model, major characteristics of the model were recorded in a table, including metaphor used, major components (e.g., assessment), and influences.

Case 2 (Fall, 1994)

Working logs. Working logs 4-5 were analyzed as described in Case 1.

Syllabus. The syllabi for Case 1 and Case 2 were compared for the differences in instructional materials, learning tasks, and course sequence were recorded.

Draft ID projects. The only draft ID project component available was the Mission Statement. Key points of the Mission Statement were grouped along similar characteristics and recorded alongside a list of belief statements from the previous Learning Principles task. Inconsistencies between beliefs and Mission Statement were recorded on a chart. A written summary of patterns, inconsistencies and contradictions was recorded.

Conferences. Working Log notes (#4-5) recorded student/instructor comments for 22 students from the second conference. These comments were recorded on the basis of ID project components or student issues. A table recorded these transcribed comments with sections categorized by learning beliefs, mission statements, ID model, ID project, and course feedback.

ID projects. ID projects were analyzed for in the same manner as with Case 1 with the following addition. For consistency, a Mission Statement was recorded in column 2 to record what students believed were important teaching and learning principles. The ID project was reviewed to note whether or not the features of the Mission Statement were addressed in the projects. A 50% cut-off was used as with Case 1.

Course evaluation: OPSCAN. The OPSCAN was analyzed using the same procedure as Case 1. Mean score responses and the number of respondents are recorded in a worksheet (See Appendix K-2).

Course evaluation: Supplementary questions. Student responses for each question (How did you feel about self assessment?, What did you learn about yourself?, Learn any new learning strategies?, Any changes in learning beliefs?, What were critical moments in the course?, and Can instructional design be taught or learned") were grouped together in terms of similarities in responses and recorded on a worksheet.

Self-evaluation. Student responses to questions (major concepts and processes learned in the course, personal designing strengths and weaknesses, and instructional improvements) were coded in terms of course, project, beliefs, ID model, and mission statement. Comments from each category were clustered together and recorded on a worksheet.

Case 3 (Fall, 1995)

Working logs. Working logs 6-9 were analyzed as in Case 1.

Email. Electronic mail between instructors and students was printed out and coded for design decision categories (learning tasks, instructional materials, course sequence, assessment) and model implementation categories (ID context, ID instruction, ID project) over 15 weeks of instruction. On a separate worksheet the coded responses were clustered under each of the categories.

Syllabus. Syllabi for Case 2 and Case 3 were examined for differences in instructional materials, learning tasks, course sequence, and assessment rubric, and recorded on a worksheet.

Draft ID projects. Weekly submissions of draft ID project components were evaluated in terms of performance criteria for each project component. A table recorded each student's performance on weekly work. The first column of this table listed the component's criteria, while the second column recorded my interpretations of student performance on that component. This table was further examined for recurring student performance. Categories were identified that labeled these patterns.

Conferences. Student comments from Conference 1 interviews were coded in Working Logs by learning tasks discussed (e.g., mission statement, project choice) or course concerns, such as questions about the readings, in-class discussions, or group activities. Interviews not attended in person and not having Working Log entries were listened to recorded on a separate worksheet were learning tasks course concerns discussed. All comments dealing with each category were clustered together and recorded on a worksheet. Conference 2 comments were coded in Working Logs by categories of student performance on their ID project, students' self-assessment of their learning, and student perceptions of the course. Comments from each of these categories were grouped together and recorded.

ID projects. Completed ID projects were analyzed with the same procedure as Case 2.

Course evaluation: OPSCAN. Same as in Case 1. Mean score responses and the number of respondents were recorded in a worksheet and in Appendix K-3.

Course evaluation: Supplementary questions. Twenty Likert-style questions (on a scale of 1 for "poor" to 5 for "excellent") were developed to evaluate student perceptions of course activities, learning tasks, and student guide features, and were recorded by students on the OPSCAN form, and hand tabulated. Mean scores and the number of respondents for each question were recorded in Appendix K-3.

Self-evaluation. Written responses from each student were coded according to categories of instructors, instruction, instructional materials, or learning tasks and transferred to a separate worksheet. Each comment included an additional descriptive label, such as "trust in instructor" or "task sheets," which helped to further cluster related categories.

Case 4 (Fall, 1996)

Working logs. Logs 10-13 were analyzed using the same procedure as in Case 1.

Email. Print outs of email communications between instructors and students were analyzed using the same procedure described in Case 3.

Syllabus. The syllabi for Case 3 and 4 were compared for differences in instructional materials, learning tasks, course sequence, and assessment rubric were recorded on a worksheet.

Draft ID projects. Analysis was conducted as described for Case 3.

Conferences. Conference 1 and 2 audio tapes were analyzed with the same procedure as in Case 3.

ID projects. Completed ID projects were analyzed as described in Case 2.

Course evaluation: OPSCAN. Analysis was conducted as described in Case 1. Mean score responses and the number of respondents were recorded in a worksheet and in Appendix K-4.

Course evaluation: Supplementary questions. Analysis was conducted as described in Case 3.

Self-evaluation. The self-evaluation was conducted orally during Conference 2 and comments related to perceptions of their learning and suggestions for the course were recorded in a Working Log entry, transcribed on a worksheet, and grouped in terms of instructors, instruction, instructional materials, and learning tasks.

Case 5 (Fall, 1997)

Working logs. Logs 14-15 were analyzed as in Case 1.

Email. Electronic mail was analyzed as described in Case 3.

Syllabus. Syllabi for Cases 4 and 5 were analyzed for differences in instructional materials, learning tasks, course sequence, assessment rubric, and were recorded on a worksheet.

Draft ID project components. Feedback on student work was recorded for project drafts submitted on 10-15-97. Weekly submissions of draft ID project components were evaluated in terms of performance criteria for each project component. A table recorded each student's performance on weekly work. The first column of this table listed the component's criteria, while the second column recorded my interpretations of student performance on that component. This table was further examined for recurring student performance. Categories were identified that labeled these patterns.

Conferences. Conference 1 and 2 interviews were analyzed with the same procedure as described in Case 3.

ID projects. Completed ID projects were analyzed as described in Case 2.

Course evaluation: OPSCAN. The OPSCAN was analyzed as described in Case 1. Mean score responses and the number of respondents were recorded in a worksheet and in Appendix K-5.

Course evaluation: Supplementary questions. Individual responses for each question were recorded on a separate worksheet. Coding of these responses was conducted on the thematic basis for each question; for example, a question from Chapter 2 asked for feedback on our presentation of ID models, and coding grouped into categories the student responses to our presentation, students' perceptions of the value of models and how these models might be useful to them.

Course evaluation: PMI Task. Students were asked to record any "Plusses" for the course, any "Minuses," and "Interesting Things to Do Next Time." Responses for each of these three categories were compiled and recorded in a table with three columns, and coded for similarities. Labels for these similarities were recorded before each column and summarized on a worksheet. In addition, students were asked to respond to three questions: (1) How do you feel now? (2) What would you do differently, and (3) Next steps (with the project or other)? Student responses generally combined these three questions into a single response, which was noted in a working log entry (WL15: 2189-2199). The notations for each student were transcribed into a single document, and a brief narrative summarized these responses.

Self-evaluation. The self-evaluation was conducted orally in Conference 2 and comments related to perceptions of their learning and suggestions for the course were recorded in Working

Log entries, transcribed, and grouped in terms of student perceptions of their performance on the ID project, student perceptions of their learning, and student perceptions of the course, and recorded on a worksheet.

Case 6 (Spring, 1998)

Working logs. Notes from Logs 15-16 were analyzed with the same procedure as described in Case 1.

Email. Email conversations were analyzed as described in Case 3.

Syllabus. Syllabi for Cases 5 and 6 were compared for differences in learning tasks, instructional materials, course sequence, and assessment rubric, and recorded on a worksheet.

Conference. One on-campus conference was audio-taped and transcribed with line numbers. Comments related to topics discussed during this portion of the course, such as mission statement, project choice, needs assessment activities, and instructional media research were coded and transcribed.

ID projects. Completed ID projects were analyzed as described in Case 1. The fourth column of the data reduction table recorded my assessment to the degree to which instructional media/technology was examined in the project.

Course evaluation: OPSCAN. Analyzed with the same procedure as in Case 1. Mean score responses and the number of respondents were recorded in a worksheet and in Appendix K-6.

Course evaluation: Supplementary questions. Mean scores were tabulated by the University. Questions, respondents for each question, and results are recorded in Appendix K-6.

Course evaluation: P-M-I form. Students were asked to record their responses to the course in terms of “Plusses,” “Minuses,” and “Interesting things to do next time.” These responses were transcribed into a table with three columns, and coded for similarities. Labels for these similarities were recorded before each column.

Limitations of Methodology and Method

Data Collection

Eight data sources were used in this study and all data were in place before the conceptual framework of the study was constructed. Figure 12 records the availability of data across the Cases.

Design decisions. Syllabi were a compact data source of design decisions for each Case. However, working logs and email conversations between the instructors informed the syllabi decisions by recording some of the thinking that led to the decisions. Email records, however, were kept for only Cases 3-6.

Model implementation. Working logs were also used to record observations of how the model was implemented. Participant observation, although a limitation in this research, is only one method of data collection described in this chapter and accounts for only one data source, the journal or working log. The case study does not depend on observations alone. An advantage to using the case study is its ability to consider a wide range of evidence-documents, artifacts, interviews, and observations (Yin, 1994). Email between instructors was also used during the

semester in Cases 3-6 to communicate about student performance and ways to revise our efforts to support their learning. However, one shortcoming with email was not having Dr. Magliaro's email conversations between her and students. Draft ID projects were another data source, but were not available for analysis until Cases 3-6. Learning tasks for ID projects evolved over time and their data analysis differed. Two different texts were used over the six cases (Smith & Ragan, 1993; Shambaugh & Magliaro, 1997), and four different versions of the student guide were tested in class.

Model evaluation. Completed ID projects were available for all Cases. A total of 50 out of 113 projects were available for analysis. The small number of projects for Cases 1, 2, and 5 may not represent the range of learner performance on the ID project for that Case. The second individual conference was not scheduled during the same point in the course across the Cases. For Cases 2-3 the second conference was held during the last week of the course and verbal comments were received from students on their completed ID projects, ID models, and responses to the course. With Cases 4-6, the second conference was moved up before the Thanksgiving holiday to give students individualized feedback on their developing projects. The supplementary questions component of the course evaluation data source evolved over the six Cases to represent more accurately the new participation structures and activities in place.

Data Analysis

The design and development cycle (Richey & Nelson, 1996) framed the research in terms of the categories of the cycle, which were modified as design decisions, model implementation, and model evaluation. Thus, data sources were identified on the basis of their potential to report on the development of the model in terms of the three phases of the development cycle. The data reduction techniques of Miles and Huberman (1994) were used to "reduce" the large amount of data to manageable form using data display "frames" or structured summaries, tables, or worksheets. The Data Reduction Notebooks were critical tools to separate the data from the reporting and to track the analysis sequence from data source to data reduction to data reporting.

Design decisions. Data analysis for design decisions was a straightforward matter of identifying changes in learning tasks, course sequence, assessment, and instructional materials from the syllabi for each Case, supported by notations in working logs and email which provided a rationale for the change.

Model implementation. Data analysis of model implementation was on the basis of the instructional sequence; first, the ID context activities followed by ID process instruction including student work on their draft projects. Working logs, electronic mail, and the first conference were used to inform details of how the instructional approach was implemented.

Model evaluation. Evaluation of the model was the most challenging in terms of the conceptual framework. Evaluation was conducted on the basis of student perceptions of their learning in course evaluations, self-evaluations, and the second personal conference. Student learning was on the basis of my judgments as to their completed ID projects. Teacher responsivity was evaluated from what students rated and reported in course evaluations, self-evaluations, and the second personal conference. What students rated and reported were categorized using Tharp and Gallimore's (1988) means of assisted performance (e.g., instructing, feeding-back, cognitive structuring).

Summary

A multiple-case methodology was used in this study to examine how the instructional approach was developed over time. Participants included 113 students and two instructors. Students were characterized by their ID experience, teaching experience, level of interest, and content area focus, while an instructor profile was provided. The instructional approach for the course was described, including course co-participation structures and participant roles within these structures, particularly the range of responsivity to learner needs based on teaching as assisted performance (Tharp & Gallimore, 1988). A design and development framework was used to describe the design decisions, implementation, and evaluation of these design decisions over six cases of the ID course. Eight types of data sources and collection procedures were described for working logs, email, syllabi, draft ID projects, conferences, completed ID projects, course evaluations, and self-evaluations. Specific analysis methods for each of the six cases were described. Limitations to the methodology and method were discussed.