The Potential of Using Computer Technology to Develop a Competency-Based Curriculum and Instructional Delivery Methods for Air Wisconsin Airlines Corporation

By

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CHAPTER I

STATEMENT OF THE PROBLEM

Introduction

With the passing of the 20th Century, many historical documentaries were aimed at summing up the most important technological advancements during this time period. The striking task of trying to sum up one hundred years of change is remarkable in itself, but because the 20th century had experienced more technological advancement compared to the last thousand years of history alone, this task was humongous. The technological changes that have occurred in the past one hundred years are almost unconceivable. At the turn of the 19th century, many things that we take for granted like the telephone, television, radio, the computer, running water, the toilet, and the airplane had not even been invented. Much of this technological change and advancement in the 20th century was do to the Industrial Revolution. The many technological discoveries of the Industrial Revolution era have moved society into now what is called the "dynamic information age"(Jennings, 1994).

One of the greatest discoveries that came from the 20th century was the ability to harness flight. Many people died trying, but in 1903 the way one would travel was changed forever when Orville and Wilber Wright performed the first successful powered manned flight. In the last hundred years, technological advancements in the transportation industry have gone from spending hours traveling across town by horse and buggy to traveling from Paris to New York in just over four hours by jetliner.

With the onset of continued technological advancements in the aviation industry, one of the major concerns is continued aircraft education program development (Walters,

1999). A question that most airlines are confronted with deals with the development of aviation curriculum and delivery methods that meet the needs of the sophisticated aircraft that they currently fly. In 1998, Air Wisconsin received delivery of the first of many new jet aircraft. These aircraft are *state of the art* and require a different educational approach when related to pilot initial and upgrade indoctrination, FAA mandated requirements and passenger safety considerations. These concerns, coupled with the fact that Air Wisconsin is operating three different aircraft types, propose a major educational challenge. Another question that is being addressed is how to produce standardized curriculum that can meet the needs of a fleet of over fifty sophisticated aircraft, over five hundred plus pilots, and extreme pilot growth. As with any technology, aircraft technology comes with a substantial price tag (Kardassis, 1999). Directly related to this is the cost that is required to educate and train a pilot. This leads to the question of how can an airline stay competitive by flying new, *state of the art* aircraft and address the educational training needs required to fly this type of aircraft, and at the same time making it cost effective?

Rational

By 2005, Air Wisconsin's aircraft fleet will nearly double in size. Since 1998, the pilot rank has gone from just over two hundred to over five hundred with steady continued growth. Due to new plane acquisition and pilot attrition, Air Wisconsin is hiring on average twenty-five pilots per month. If the inevitable does happen and Air Wisconsin's aircraft fleet does double, the pilot rank would double in size. This will be required to meet the needs of the pilot to plane ratio of ten to one, without even taking into account for continued pilot attrition.

Technological advancements in aircraft system design have also proposed a significant educational challenge (Walters, 1999). Most all new commercial aircraft built today have a sophisticated computerized system that controls and monitors most everything aboard. This system is known as the Electronic Flight Information System (EFIS). The EFIS system is the "brain" of the aircraft body and information from this system is displayed onto a glass cockpit display screen (Thomson, 1999). All pilots, new and old alike, have had to be retrained because of this technological advancement. Because of the sophistication of EFIS and the method by which information is displayed, the chalkboard method of instruction cannot appropriately train a pilot for full system comprehension. This has forced aviation educational experts to research, test and implement new methods to meet these needs while staying within budget (Harrington, 1998).

Due to technological advancements in aircraft design, a pilot can no longer fly from point A to point B without first confronting the onboard computer. Everything from aircraft system manipulation to navigation is interfaced with a flight computer. The problem that aviation instructors at Air Wisconsin are plagued with is that the instructional method and tools to train pilots are outdated. Textbook and chalkboard methods of instruction are still used, but this alone cannot appropriately train a pilot who is flying a computer driven aircraft. Instructors are not only tasked with training a pilot how to fly a specific aircraft and all that goes with this, but are now challenged with developing a computer literate pilot who is capable of manipulating a computer that controls most all aircraft system components.

To meet educational training needs, the potential of the computer as an instructional tool is becoming quite evident (Walters, 1999). Today's computers can provide and integrate many kinds of performance support such as information, technical advice and various types of computer-based training (Stevens & Stevens, 1995). Airlines like Air Wisconsin have identified this need and benefit, but are confronted with finding the appropriate curriculum development tool and computer-based training program that will meet their training requirements while staying within budget.

Purpose of the Study

The purpose of this study is to investigate the effect of using the computer to develop competency-based curriculum and instructional delivery methods.

Research Questions

1. Do pilots want computer-based training to be a part of their overall training syllabus at Air Wisconsin?
2. Do pilots believe that computer-based training is beneficial in the training process at Air Wisconsin?
3. What are pilots' attitudes towards computer-based training: positive or negative?
4. Do pilots believe that more up-to-date training options like CD-ROM development and Internet training coursework could save Air Wisconsin money towards training costs?

Definition of Terms

BAe 146- British Aerospace 146 Jet

CASCADE- Computer Assisted Curriculum Analysis, Design and Evaluation

CBI- Computer-based Instruction

CBT- Computer-based Training

CGI- Computer-guided Instruction

CRJ- Canada Air Regional Jet

D38- Dornier 328 Turbo Prop

EFIS- Electronic Flight Information System

EPSS- Electronic Performance Support System

FAA- Federal Aviation Administration

Jet Aircraft- An airplane that is powered by one or more jet engines.

Pilot Initial Training- Ground and flight training that a pilot receives to be qualified to fly the plane, which he or she is being trained in.

State of the Art Aircraft- Aircraft that are fully modernized to the maximum technological extent possible.

WIDS- Wisconsin Instructional Design System

Limitations

1. The survey used was limited to Air Wisconsin pilots only.
2. The survey was delivered to the participants via e-mail only.
3. A percentage of pilots surveyed do not fly a computer-driven aircraft, which is not considered *state of the art*.
4. A percentage of pilots surveyed have never received computer-based instruction.

CHAPTER II

REVIEW OF RELATED LITERATURE

Purpose of the Study

The purpose of this study is to investigate the effect of using the computer to develop competency-based curriculum and instructional delivery methods.

Technological Advancements

Due to technological advancements in the last century, educational resources and teaching methods available to instructors have drastically changed (Wraga, 1997). The late 20th century seemed to be a transitional period where educators were witnessing the computerization of education, the development of multimedia instructional materials, experimentation with interactive and intelligent software which created a new type of educational experience, and a general trend which might be referred to as electronic curriculum development (Rath, Rieck and Wadsworth, 1998). One of these changes in particular is in the field of information technology (Fougere and Olinsky, 1990). The amount of information available has become overwhelming and because of this, the computer has become an integral part of everyday life in education. Whether it is accepted or not, a fundamental shift is occurring in education as a result of the increasing use of computers. Strange (1995) calls the shift a cultural revolution in teaching and learning.

The computer has the potential to be used as an effective instructional tool to support the curriculum and enhance learning in a variety of ways in all disciplines (Anderson, 1990). Anderson, a consultant with the Department of Public Instruction (DPI), identified eight different kinds of computer-aided learning programs:

1. **Drill and Practice** programs review and reinforce concepts or skill already taught.
2. **Tutorial** programs introduce/explain concepts and facts. They may provide initial exposure to materials.
3. **Simulation** programs are designed to model real-world environments in which students can investigate areas of mathematics, social studies, ecology, physics, chemistry, and so on. Simulations allow students to make decision and interact in situations that are often historical, or too complex, expensive, dangerous, or distant to e brought into the classroom.
4. **Discovery** programs are used to develop cognitive problem-solving abilities in specific subject areas such as math, language arts, social studies, and others.
5. **Instructional Games** programs are designed to hold a user's attention and interest while teaching logical thinking or making practice less tedious.
6. **Word Processing** programs use the computer and specialty software to facilitate the writing, editing, formatting, and printing of reports and other documents.
7. **Data Bases** use the computer to collect, organize, retrieve, sort, display, and print data of all kinds.
8. **Spreadsheet** programs use the computer and specialized software to simulate a business or scientific worksheet. A spreadsheet program can manipulate data entered into "cells" in the electronic worksheet automatically.

Anderson further states, "The effectiveness of a student's education can be significantly improved by increased use of electronic educational tools. Such tools take students

beyond traditional classroom experiences to future-oriented curriculum and problem-solving activities not previously available."

Rath et al. (1998) found that numerous organizations have called for the increasing use of computers for both teaching and learning (AACTE Task Force on Technology, 1989; American Association for the Advancement of Science, 1993; Carnegie Commission on Science, Technology, and Government, 1991; National Research Council, 1996). Research has demonstrated that the cost of computer-assisted instruction is less per pupil than conventional teaching methods (Fletcher, Hawley and Piele, 1990). In addition, Fletcher-Flinn and Gravatt (1995) identified that considerable original research and meta-analyses have demonstrated a positive learning benefit associated with computer-assisted instruction. Because of this, Rath et al. (1998) note that many educators are transferring existing curricula to the computer and also designing new curricula by using computer-assisted curriculum development methods.

The advance of computer-based performance support in various educational arenas has prompted the question of whether the computer could also provide a supportive role in the complex domain of instructional development (Nieveen and Van Den Akker, 1999). In 1993, Nieveen, Van Den Akker and Plomp, (1999) performed a study of CASCADE (Computer Assisted Curriculum Analysis, Design and Evaluation), a computer system that is used to help design and evaluate curriculum. The results of this study suggested that the use of CASCADE could: (a) improve the consistency of curriculum plans and activities; (b) motivate developers by elevating their confidence in using computers for development; (c) save time; and (d) help to provide justifications for decisions made.

An example of using the computer for instructional development is the Wisconsin Instructional Design System (WIDS) developed by the Wisconsin Technical College System Foundation, Inc. WIDS Instructional Designer is a software program that guides an instructor in the development and design of performance-based curriculum instruction (Thompson, 1998). Thompson explains that WIDS Instructional Designer software:

- Guides the instructor through a consistent instructional design process
- Saves development and revision time
- Provides job aids such as action verb, learning activity, and core ability libraries
- Presents curriculum checklists, examples, and "how-to's" on every screen
- Generates customized, user-friendly print materials for students and teachers
- Organizes curriculum components into: competency profiles/course outlines, learning plans, lesson plans, performance assessments and rubrics, syllabi
- Aligns assessments with learning results
- Is networkable or stands alone

The WIDS Model guides designers to define the who, what, when, and how of learning and aligns intended results, assessments, and learning strategies (Thompson, 1998). Mr. Bryan Albrecht, Division Director of Lifework Education with the Wisconsin Department of Public Instruction expounds, "WIDS has provided a foundation for school improvement in Wisconsin by linking performance-based curriculum and occupational-based skill standards. Through WIDS, teachers and employers can share a common framework for education and sharing" (Interview, 2001).

Standards and Assessment

The computer has become an integral part of our industrial, business and educational structure in the United States. With this, society is becoming overwhelmed by the complexity and consistency of change, and the amount of information available via the computer and the internet (Senge, 1990). Senge contends that perhaps for the first time in history, humankind has the capacity to create far more information than anyone can absorb, to foster greater interdependency than anyone can manage, and to accelerate change far faster than anyone's ability to keep pace. This overabundance of information has also lead to problems within our educational system and has forced educational leaders to ask questions about effective and efficient ways to evaluate curriculum for validity (Jasparro, 1998). This is not just a local issue, but has grown into a state and national standard-driven reform effort (Robertson, 2000). According to a 1998 report by the American Federation of Teachers (AFT), the commitment to standards is strong across the country and increasing in intensity (Glidden, 1998). Glasser and Finn (1993) believe that as historians look back at 20th century public education in the United States, the emphasis on standards in the 1990s will loom as one of the most important movements of the century. The computer is the Electronic Performance Support System (EPSS) that can be used to help educators deal with the massive quantities of information, develop standards and address assessment (Gery, 1991; Hudzina, Rowley and Wager, 1996; Raybould, 1995).

To stay abreast of rapid changes in technology and to help set direction, a needs assessment study has become "standard procedure" in the educational arena (McDonald, 1999). A needs assessment is the process of scanning the environment using a variety of

information to sort out problems, priorities, opportunities, and learning needs so decisions can be made about future professional development programs (Champion, 2000). It also involves making judgments about how to deal with the discrepancy between what we know and do and what we need to know and do to achieve the organization's expectations for performance (Champion, 2000). Champion (2000) believes that a good needs assessment must be; (a) informal, (b) customized to fit each situation, and (c) repetitive and ultimately always involves making judgments, suggesting choices, and setting priorities. Champion (2000) proposes four questions to guide discussions when conducting needs assessment. The four questions are:

1. Did we plan the needs assessment activities collaboratively?
2. Did we use more than one source of information to make decisions?
3. Did we use available data well?
4. Did we gather needs information over time?

As a planning team analyzes each of these questions, alternatives and options that address key issues may be revealed and provide short and long term direction (Blackwell, 1997). A thorough and comprehensive assessment and planning process will provide a road map for curriculum improvement (Blackwell, 1997). Blackwell also expounds that this process is an excellent method of including district staff and community members in what often becomes a pre-bond analysis and needs assessment process which leads to effective curriculum development. A large number of studies have demonstrated that one of the defining features of effective classroom curriculum is that it is organized around specific learning objectives (Fraser, 1987). In fact, one review of more than 50 studies

found that organizing curriculum around specific learning objectives increased student achievement by 34 percentile points (Marzano, 1998).

A method that has been developed to evaluate if a course is doing what it was intended to do is benchmarking (McDonald, 1999). The process of benchmarking is a variation of curriculum auditing that has been proven helpful in answering such questions and represents an overlay of a school's big picture on a single course or program (Shelly, 2000). Shelly explains that if a course is not meeting expectations, serving students, or is simply in need of adjustment, the benchmarking process provides the essential data that is needed to provide a fix or to go in another direction. Jasparro (1998) believes that if benchmarking is not used as a method for evaluation and because of this, major discrepancies exist between the curriculum as written and the curriculum that is implemented by teachers, curriculum guides often end up sitting on shelves gathering dust.

Curriculum Reform

A critical factor in the development of new and innovative quality curriculum and delivery methods is the teacher's willingness to be a part of this process (Saban and Ahmet, 1995). Haberman (1992) states that it is also very important that administrators develop a critical understanding of how classroom teachers fit into the process of curriculum development. Historically, teachers were viewed as implementers of externally created curricula and instructional materials that were prescribed for them (Saban and Ahmet, 1995). Saban and Ahmet have identified that recently the efforts to involve teachers in the development of school curricula outside the classroom have received considerable attention.

Saban and Ahmet (1995) note that the following outcomes are likely to result when teachers are included in the process of curriculum development and delivery:

A. Curriculum Excellence: Teachers reflection on their classroom practices is a means of promoting curriculum excellence. According to Young (1985), teachers can contribute their knowledge of what works and what does not work in a real classroom. By doing this, teachers can bring student problems and school needs to the surface and help solve curriculum problems as well as acquire important knowledge and skills for classroom application (Young, 1993).

B. Staff Development: Teacher participation in the curriculum development process can be used as a staff development activity. Killion (1993) believes that curriculum development and staff development pursue common goals and go hand in hand. According to Killion (1993), when teachers are involved in the revision, development, or evaluation of curriculum materials, they at the same time engage in an important form of staff development.

C. Professional Growth: Teacher participation in curriculum development is a means of professional growth. According to Young (1998), the opportunity to participate in curriculum development helps teachers meet the ever-changing demands of the teaching job by being introduced to new instructional ideas, materials, and strategies. Involvement in the curriculum work provides the opportunity for teachers to reflect upon and enhance their professional knowledge of classroom teaching (Killion, 1993).

D. School Improvement: Teacher participation in curriculum decision-making is a method to improve schools. The opportunity to participate in curriculum

> development help teachers develop collaborative working relationships with other instructional professionals in the school. Sergiovanni (1994) believes that community building must become the heart of any school improvement effort because it binds school members to shared ideas about schooling, teaching, and student learning and provides a sense of identity, belonging, and a safe place for its members.

Saban and Ahmet (1995) believe that through participation in curriculum work, teachers become familiar with the current developments in their subject areas and develop a sense of staff collegiality and willingness to cooperatively practice professional expertise in the school. Likewise, teacher participation in curriculum development is a way of connecting curriculum and teaching to one another and of taking collaborative action in school decision-making.

The ability to use technology to one's advantage when related to curriculum design and development has become a very pressing question in education (Robertson, 2000). Curriculum can be defined as the compilation of plans, including goals and objectives, which take place in the educational setting (Rieck, 1996). The process of developing instructional materials are a wide and varied practice, but the approaches commonly associated with the design and development of computer-based instruction are generally grouped under the heading of instructional design (Dick, 1987). Most schools and instructors are increasing their use of computers for both direct and indirect instruction, and curriculum design (Michaels, 1990). Bowens (2000) comments that integrating computer-based instruction into new and existing curriculum will:

- Provide for more student-centered learning
- Engage students in critical thinking
- Allow for cross-curricular integration
- Easily incorporate into the performance-based classroom
- Require students to apply essential skills in the context of meaningful learning experiences
- Provide opportunities to assess and evaluate student work

Curriculum reform comes slowly for all curricula, whether or not computers or any other new technology is revitalizing the content area, especially in view of the nature of the public policies debates on education (Cohen and Spillane, 1992; James, 1991; Schubert, 1993). In the last 20 years there has been many inconsistent results, but continued secondary analysis of previous research still shows a small positive effect size which favors the use of computers and their ability to increase student learning (Fletcher-Flinn and Gravatt, 1995). Despite the slow rate of educational reform, and the numerous constraints on the integration of computers into the curriculum, the general outlook for educational computing is positive (Doornekamp & Carieer, 1993).

Rath et al. (1998) state that there are still many unanswered questions regarding the use of computers for instructional use and curriculum development. There are many issues which are undecided regarding the student's attitudes toward the use of computers (Askar, Yavuz, and Koksal, 1992), the use of computers in the testing and assessment of student achievement (Frederiksen, 1994), and the best methods to achieve effective teacher training (Maddux, Johnson, and Harlow, 1993). Yet both the theoretical perspective on computers in the curriculum and the many articles proposing and testing

particular computer-based instructional materials have the potential to make significant changes in the daily practice of teaching and learning (Bransford and Vye, 1989; Larkin and Chabay, 1989).

Curriculum Delivery Methods

Information and communication technology tools permeate almost every professional domain today and much of this advancement has been geared toward the field of instructional delivery (Nieveen and Akker, 1998). In the past ten years, the tools that have been developed have greatly enhanced the educational process and revolutionized the way one is taught (McDonald, 1999). Today, a challenge for educational institutions is to keep pace with the rapid development of computer technology (Fougere and Kenneth, 1990). The benefits of computer usage in the classroom are overwhelming and because of this, Computer-Based Instruction (CBI) is becoming widely accepted in the field of education (Fougere and Kenneth, 1990).

It is increasingly common that teachers and educators are designing and developing multimedia instructional materials for distribution on CD-ROM (Rath et al., 1998). The World Wide Web may be getting most of the attention, but the number of CD titles is rapidly increasing and they seem to have a greater likelihood of being incorporated into schools in the short term (Strange, 1995).

The design and development of CDs is turning out to be significantly different than the process of designing, for example, textbooks (Rath et al., 1998). Rath goes on to say that while a CD has many characteristics, which are similar to its precursors, the differences are turning out to be quite significant. Whether one approaches the task from the theory of instructional design (Gagne, Briggs, and Wager, 1988) or from a practical

design point of view (Chabay and Sherwood, 1992), a new delivery method is being tested and applied. The book, for example, profoundly changed the nature of teaching and learning (Rath et al., 1998). With this, Rath believes that today, the computer (as the communication tool) and the CD (as the curricular tool) are starting a process equally as significant in terms of the future of education.

Although the CD has been proven to be a great teaching and learning tool, a problem has surfaced in the development phase. When programmers and others develop CDs and other new media outside the education mainstream, it seems curriculum plans and instructional design models are not used as reference or to guide development (Rath et al., 1998). Because of this, Rath has noted that instructional products are adapted to the class schedule, rather than products, which directly relate to curriculum goals. Rath goes on to say that no publisher has developed a series of CD-ROMs that is distributed along a course sequence, such as a series of textbooks might cover a topic. It seems likely, however, that the day may be coming soon when the students get a CD-ROM, or a series of CDs, instead of the textbook, and if practice remain somewhat similar, the teacher will work up lessons to make particular points based more or less on the primary resource and instructional materials on the CD.

With the growth of the World Wide Web and its ease of use, the Internet has become an attractive option for educational purposes (Powers, 1997). With the use of the Internet, students can use the computer to research specific topics and prepare presentations, while the instructor can implement specific assignments requiring students to use the computer as a research and reporting tool (Robertson, 2000). Robertson

explains that these lessons should take students beyond mere assimilation of content and superficial levels of understanding to areas of synthesis, analysis, and evaluation.

With the vast amount of information that is available over the Internet, a question that many instructors ponder over is how to use this tool in the classroom to better meet the needs of students (Robertson, 2000). Dr. Bill Robertson, a professor at the University of California and member of the Coordination Team at Los Alamos National Laboratory, has developed a framework that aids in helping teachers facilitate the process of integrating computer technology and the Internet into classroom instruction and curriculum design. He has organized his instructional approach into five basic phases: planning, research, development, refinement, and implementation. The objectives of these five phases are explained below:

1. Planning: This phase helps to define the current knowledge base and to develop the foundation for the organization of learning tools; Inspiration Concept Mapping.
2. Research: This phase allows the learner to explore the content area and to deepen their knowledge base.
3. Development: This phase provides the learner with the opportunity to construct their knowledge following the curriculum materials and scope and sequence of the instruction.
4. Refinement: This phase assists to further the development and to lead the learner to the implementation phase.
5. Implementation: This phase demonstrates the learning that has taken place through the phase.

Robertson (2000) feels that this format is one way to build a curriculum, lesson plans, instructional units, or presentations that integrate the tools of computer technology and the Internet with classroom content. In this way, the tools are not the focus of the instruction, but are imbedded in the facilitation of the learning process and learning it in a context that has meaning and purpose.

The Internet has also become a means for alternative course delivery (Powers, 1997). Powers comments that from the viewpoint of faculty and administration, a course offered over the Internet may relieve scheduling difficulties for courses and rooms as well as being a good public relations tool for non-traditional students. He goes on to say that from the standpoint of the student, such courses provide opportunities to students who may not otherwise be able to come to campus as well as providing exposure to alternative learning environments.

Instructional design focuses on facilitating an individual's learning while taking into consideration the specific context of the learning environment (Gagne, Briggs and Wager, 1998). Although students taking a course via the Internet will not have an equivalent experience compared to those students who enroll in traditional classroom instruction, it is expected that they leave the course with the same knowledge base (Willis, 1992). When courses are being delivered over a distance and particularly over the Internet where face-to-face contact is not possible it is imperative that a course is well designed (Powers, 1997).

Adhering to sound principles of instructional development will provide a process and procedural framework for addressing the instructional challenges that will arise when

related to the development of a course offered over the Internet or by distant learning (Willis, 1992). Willis identifies four basic stages of this process:

1. Design Stage: This stage focuses on gathering information to help understand the instructional gap between what is and what should be. Steps include defining the problem or need, understanding the audience, and identifying instructional goals and objectives.
2. Development Stage: Steps in the development stage include creating a content outline based on the instructional problem, the audience analysis, instructional goals and objectives, and an understanding of the desired course content.
3. Evaluation Stage: The primary purpose of evaluation is to provide information to decision makers. According to Brook (1990), the utility of educational evaluation is enhanced by immediacy, clarity, regularity, accessibility, and future orientation. There are two approaches to evaluation: formative and summative. Formative evaluation is ongoing throughout the instructional development process and helps ensure that the course or instructional product will achieve its stated goals (Flagg, 1990). Summative evaluation is conducted upon course completion and is used to determine the overall effectiveness of the class or instructional product.
4. Revision Stage: Revision plans typically are a direct result of the evaluation process in tandem with feedback from colleagues and content specialists. The best source of revision ideas may be the instructor's own reflection on course strengths and weaknesses. For this reason, revision should be planned as soon as possible after the course ends.

According to Willis (1992), adhering to sound principles of instructional development won't overcome all of the obstacles one encounters in route to developing effective distance education programs. It will, however, provide a process and procedural framework for addressing the instructional challenges that will surely arise.

Summary

The review of literature emphasizes how important the computer has become in education and training today. This also holds true when related to modern aircraft system design. Technological advancement has led to the integration of the computer in most all areas of the workplace and in everyday living. Not long ago the computer was looked at as a threat to educators, but in the last five years the many benefits that the computer has to offer has become a major factor in promoting change in our educational establishment. Because of this, the computer is reshaping the way one is taught and has opened the door to many new educational tools that can be used to assist in the educational training process.

Many industries, like Air Wisconsin, are confronted with the question of how to cope with constant change in the workplace that is being driven by technological advancement. Technological advancement in the workplace has also forced employers to reevaluate how their workforce is trained. Industries worldwide have identified the importance of a well-trained workforce, but like our public educational system, are searching out new and innovative ways to do this while staying within budget.

CHAPTER III

METHODOLOGY

Purpose of the Study

The purpose of this study is to investigate the effect of using the computer to develop competency-based curriculum and instructional delivery methods.

Pilot Sampling Background

The population that I chose to sample stemmed from all pilot groups at Air Wisconsin. Air Wisconsin flies three different types of jets: the Dornier 328 Turbo Prop (D38), the Canada Air Regional Jet (CRJ), and the British Aerospace 146 Jet (BAe-146). These aircraft vary in passenger carrying capacity, which ranges from thirty-two for the D38, fifty for the CJR, to one hundred for the BAe-146. Pilot age also varies significantly, with pilot age ranging from twenty-one to fifty-nine. Also, the age of aircraft flown at Air Wisconsin spans a wide range of years and technological sophistication. The D38 and the CRJ are *state of the art* when it comes to aircraft technology and are no more than five years old, while the makeup of the BAe-146 is based around twenty year old technology. With this, when comparing pilots and specific age groups with the type of aircraft flown, a pattern does become evident. The majority of older pilots fly the older, less technologically advanced aircraft, compared to the younger pilots who fly the more technologically advanced aircraft. There are many reasons for this pattern, but the most significant reason that stands above the rest is that a pilot can make more money flying the largest aircraft that has the highest passenger carrying capacity, like the BAe-146. Whether or not a pilot ends up flying the BAe-146 is usually determined by pilot seniority, not just choice.

Sampling Method

The sampling method that was used was cluster sampling. Cluster sampling randomly selects groups, not individuals, and all the members of selected groups have similar characteristics. Also, cluster sampling is most useful when the population is very large or spread out over a wide geographic area. I chose this type of sampling method because all members of my selected group had similar characteristics, and for logistical reasons, such as finding individual e-mail addresses, I could mass e-mail my survey to them with little inconvenience. Another reason why I chose to go with cluster sampling was because, in the long run, I would end up getting a greater number of surveys back as compared with using other sampling methods. The end result would be more surveys, which in turn would provide more data to support the research.

Instrument Used

A survey was the instrument used to collect the data needed to support the research. Most of the survey questions were developed so the necessary data could be obtained to answer the research questions proposed in Chapter I. Other factors that played a part in the development of the survey questions were derived from:

- My personal experiences obtained from flying at Air Wisconsin, and classroom/flight training received
- Working with the Air Wisconsin Training Department on curriculum and training materials
- Working as a public school teacher
- Conversations with Air Wisconsin line pilots regarding their ground and flight training experiences

- Conversations with Air Wisconsin management personnel regarding current and future ground and flight training plans

Also, because the makeup of the pilot group surveyed varied significantly when considering pilot age, experience level, and aircraft flown, each question had to be tailored appropriately so that each question had true meaning and validity. To help with this task, I worked with several individuals to gain feedback. Their names are listed below:

- Captain Mark Raymond, BAe-146 Pilot
- Captain Mike Bauer, CRJ Pilot, Director of Ground Training
- Captain Craig Christensen, Senior BAe-146 Instructor Pilot
- First Officer Mike Kirkpactrik, BAe-146 Pilot and Lead Ground Instructor
- Dr. James Juergensen, Advisor

Deciding to use the survey was not a hard decision, but how to administer it took much more time and effort. When considering that Air Wisconsin has over six hundred pilots who are scattered all over the United States, much thought and consideration went into the best method to reach this pilot group. At first, I considered mailing my survey, but after calculating the cost of photocopying and mailing, the financial burden became too great. It finally dawned on me that if the purpose of my study was to investigate the effect of using the computer to develop competency-based curriculum and instructional delivery methods, maybe I could use the computer as the tool to send my survey. After considering how Air Wisconsin communicates with most all of their six hundred plus pilots on a regular basis, it became obvious that using e-mail to mail my survey would be the best method and most cost effective means to accomplish this task. The next hurdle

that I needed to overcome was how to build my survey into a computerized document that could be sent over the Internet.

Procedure Followed

After consulting with several computer savvy individuals, I finally found an individual who could help me with this task. Captain Mark Raymond, a pilot at Air Wisconsin who manages the Air Wisconsin Pilot Information Website, agreed to help me with changing my survey cover letter and my survey from paper form to a computer survey document (See Appendix A and B, Survey Cover Letter and Computer Guided Instruction Training Survey). Captain Raymond helped me with setting up my survey questions so all the pilot had to do to answer each question was to click on a response, and at the end of the survey, click on "SUBMIT" and through hyperlinks that were established, the results of each pilot's survey were sent to my Internet address. Captain Raymond also constructed my survey so that when I received a survey via e-mail, no sender address was attached, which helped with the problem of sampling bias (See Appendix C, Survey Raw Data). My e-mail survey was sent to all Air Wisconsin pilots who were in Captain Raymond's data bank, which totaled five hundred nine pilots out of a total pilot population of six hundred fifty four pilots. Pilots were allotted fifteen days to respond.

Data Analysis

As surveys were mailed back to me, I copied down the individual pilot responses and transferred them to a master tally log. This master tally log was a hard copy of the actual survey that I printed out from my own personal computer (See Appendix D, Master Tally Sheet). The main reason why I used a copy of the actual survey for documenting my data results was because it was organized in the same order as the data

from each pilot's survey, which would greatly reduce the chance for human error. After the fifteen-day allotment expired, I tallied my results for each question, calculated a percentage for each answer on the survey, and saved all of the comments from pilots that were made in the "Comments" section of the survey. This information is found in the "Findings and Results" section of my thesis. The last step to my data analysis was to send a letter, via e-mail, to all pilots within Captain Raymond's data bank, summarizing my findings and thanking them for participating in this survey (See Appendix E, Letter of Thanks).