An Evaluation to Determine the Need to Re-teach the Keyboard at the High School Level in Merrill, Wisconsin

by

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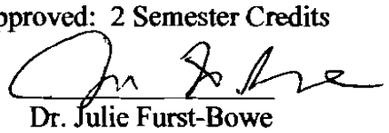

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ABSTRACT

The purpose of this study is to administer a survey and skills test to students enrolled in the Information Processing class at Merrill High School to determine entering keyboarding competencies. The results of the study will identify if there is a need to re-teach the keyboard at the high school level. The results of the study will also determine if there is a need to change the current curriculum in the Information Processing course. No prior study has been done to determine if the Information Processing curriculum is effective as it is currently being presented. With students learning the keyboard in elementary schools and computer use being integrated into core subject areas, it would appear as though students could learn basic, intermediate and more advanced keyboard skills as they progress through elementary, middle and high school. This research will determine if that is the case in the Merrill School District.

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Chapter I: Introduction

The Merrill Area Public Schools District (MAPS) is located in north-central Wisconsin and encompasses most of southern Lincoln County. The city of Merrill is located near the Lincoln County and Marathon County border along the Wisconsin River and is 146 miles north of Madison, Wisconsin, 93 miles west of Green Bay, Wisconsin, and just 15 miles north of Wausau, Wisconsin. Merrill is the largest city in Lincoln County, with an estimated population of 10,145 (City-Data, 2007), and a county population estimated at 30,150 (FedStats, 2007).

MAPS 2006/2007 enrollment was 3,085 students, which ranks it as the 62nd largest district out of 426 districts in the state of Wisconsin (Wisconsin Atlas of School Finance, 2007). The school district boundaries cover 571 square miles of Lincoln County's 883 square miles, which ranks it the 5th largest geographic district. The district offers comprehensive pre-kindergarten through grade 12 programming. There are five elementary schools, one middle school, one high school, and one Head Start program and early childhood school in the district. The schools are staffed by 204 teachers (Local School Directory, 2007).

One school within the MAPS district is Merrill High School. The departments at Merrill High School consist of Agriculture and Natural Resources, Art, Athletics, Business and Information Technology Education, Counseling and Career Services, English, Family and Consumer Education, Foreign Language, Health, Mathematics, Music, Physical Education, School-to-Career, Science, Social Studies, Special Education, Technology and Engineering Education, and Library Media (Course offerings booklet, 2007).

To qualify for graduation from Merrill High School, a student needs to earn 21.5 credits, of which 8.5 credits are from elective classes (Course offerings booklet, 2007). These elective classes may be from art, agriculture, music, foreign language, family and consumer education, technology education, and business and information technology education.

The Merrill High School Business and Information Technology Education Department (B&IT) has three instructors who currently teach courses in marketing, office training, computer applications, medical terminology, business law, personal finance, media productions, information processing (keyboarding), introduction to business, accounting, medical business procedures, and health internship. All of these courses are considered elective courses.

Information Processing I and II, Computer Applications I and II, Introduction to Business, Business Law, Marketing IA and IB are available to take for Advanced Standing. "A student who earns a B or better in an articulated high school class will receive Advanced Standing technical college credit at all Wisconsin technical colleges that offer a similar program of study" (Course offerings booklet, 2007, p. 8).

Being implemented for the first time in 2008-2009 will be Transcripted Credit for classes in Introduction to Business, Accounting, and Marketing. Transcripted Credit is described as "an actual technical college course, using college textbooks and materials that are taught to high school students. Students simultaneously earn high school and technical college credit" (Course offerings booklet, 2007, p. 8). The Business & Information Technology department is also responsible for the marketing cooperative (co-op) worksites, employability skills worksites, health internships, and business co-op work-

sites. In MAPS course offerings handbook, the B&IT department's general description states that success

> in business today requires technology and skills for the internationals marketplace. The business and marketing programs are designed to service the entire student body through a relevant curriculum oriented to providing career direction, job skills, employability, knowledge, lifetime skills, and a sound foundation for advanced study. (Course offerings booklet, 2007, p. 12)

One of those job skills and lifetime skills needed appears to be keyboarding. In the MAPS district, keyboarding is no longer a specialized class offered in grades six through eight, but is being integrated into other subject areas as recommended by the Merrill Area Public School District's Technology Committee. This committee is comprised of MAPS principals, elementary teachers, middle school teachers, high school teachers, technicians, and the MAPS curriculum director.

The touch type method is used at Merrill High School to teach keyboarding in the elective Information Processing I class. Along with teaching the touch type method, the business education instructor deals with ergonomics of continuous keyboarding. Correcting poor keyboarding habits from the beginning is vital. One of the goals is for students not to adopt improper "hunt-and-peck" typing techniques, thus needing to relearn proper technique at a later date.

Another objective for keyboarding instructors to share with their students is the importance of health and safety issues of using the computer. Utilizing the proper techniques will help the student become a proficient typist with fewer injuries.

Proper technique is stressed, then accuracy, and speed last. Speed will improve with practice. The desired speed for the students of MAPS high school Information Processing I class is 45 words per minute (WAM). Wisconsin's Model Academic Standards for Information & Technology Literacy state "by the end of grade 12, students will demonstrate proper keyboarding mechanics and touch type accurately (suggested range 30-35 WAM)" (Wisconsin DPI, 2002, p. 8).

Statement of the Problem

With the elimination of the middle school keyboarding class in the MAPS district and changes in keyboard instruction with computer integration into other subject areas, the High School Business & Information Technology educators have little knowledge of the keyboarding competencies of incoming students enrolled in an elective 9-12th grade Information Processing (keyboarding) class. Will students demonstrate sufficient keyboarding skills for the Business & Information Technology teachers to proceed to more advanced computer applications? This information is necessary for the MAPS district to meet the Wisconsin DPI Model of Academic Standards for Business Education and Wisconsin's Model Academic Standards for Information & Technology Literacy.

Purpose of the Study

The purpose of this study is to administer a survey and skills test to students enrolled in the Fall, 2008, Information Processing (keyboarding) class at Merrill High School to determine entering keyboarding competencies. The results of the study will identify if there is a need to re-teach the keyboard at the high school level, specifically at Merrill High School in the MAPS District.

The significance of the study is to determine if there is a need to change the current curriculum in the elective Information Processing course. No prior study has been done to determine if the Information Processing curriculum is effective as it is currently being presented.

Research Questions

This study attempted to answer the following research questions:

1. What are the keyboarding knowledge competencies of students entering Information Processing I?
2. What are the keyboarding psychomotor competencies of students entering Information Processing I?
3. What is the difference in knowledge and psychomotor competencies based on selected demographic factors (gender, age, previous courses, computer at home)?
4. What is the difference in knowledge and psychomotor competencies based on the elementary school (private or public) they attended?
5. What is the difference in knowledge and psychomotor competencies based on the middle school (private or public) they attended?

Importance of the Study

This study is important for the MAPS district for the following reasons:

1. This research is considered necessary to recognize the keyboarding needs of students in the MAPS district. Recognizing the needs could provide a platform for further study. Information Processing (keyboarding) teachers will be better equipped to meet students' keyboarding needs. The study could pro-

vide information to the teachers as to the competencies of future students based on numbers extrapolated from the study.

2. The data collected will provide information about the keyboarding proficiency of high school students at Merrill High School in the MAPS district. These proficiencies are critical to evaluating keyboarding benchmarks and standards. The data collected will provide information to determine if state DPI standards are being met. If these standards are not being met, the study may identify why a breakdown is occurring and will suggest potential interventions.
3. The Information Processing program may be more attractive to potential students for the purpose of increasing and updating computer skills. Class relevancy may become clearer to potential students by updated course descriptions should changes occur.
4. The outcome of this study could be used by other school districts to also transform their keyboarding curriculum. A district with similar demographics and curriculum may find the study valuable.
5. The data collected will help determine if the students possess the necessary basic literacy skills for entry-level jobs.

Limitations of the Study

There are several limitations to this study that include:

1. This research was limited to those students who enrolled in an elective Information Processing class at Merrill High School in the MAPS district. Merrill High School had an enrollment of 1,157 in grades 9-12, of which 38 students were enrolled in the Information Processing I classes.

2. The skills assessment given to students was administered by the researcher. Complete impartiality could be questioned.
3. This study was for informational purposes only and did not include considerations of revisions to the keyboarding program at the elementary or middle school level in the MAPS district. The study approaches any potential change at the high school level only.
4. A survey developed by the investigator was used. The presence of the human element indicates that the survey may contain assumptions, misstatements, or omissions not intended by the investigator.

Assumptions

This study assumed that:

1. Respondents would answer honestly.
2. Respondents would complete and return the survey and skills test in a timely manner.
3. The computer equipment utilized for the timings would not fail or malfunction.

Definition of Terms

The following terms are used throughout this paper:

Advanced Standing – "A student who earns a B or better in certain high school courses will receive Advanced Standing Credit at a Wisconsin technical college offering similar programs of study" (Course offerings booklet, 2007, p. 8).

Articulation agreement - Advanced standing agreements are made between the technical college and the high school for high school classes that cover the same content

as technical college courses. Students earn college credit by successfully completing the high school course with a grade of B or better. High school courses with advanced standing agreements have "AS" as part of the course title and are indicated on the high school transcript (NTC Glossary of Terms, n. d.).

Cooperative Education - "A method of instruction of vocational education for individuals who, through written cooperative arrangements between the school and employers, receive instruction, including required academic courses and related vocational instruction by alternation of study in school with a job in any occupational field. The two experiences must be planned and supervised by the school and employers so that each contributes to the student's education and employability" (Glossary of Terms Related to Work Based Learning, 2003, p. 1).

Ergonomics - "The study of how a person's work environment and tools affect the person" (Hoggatt, Shank, & Barksdale, 2006, p. G2).

Hunt & peck - An inefficient manner of keying which relies on visually locating the keys, and typically only employs two fingers and the thumb of each hand. (The Free Dictionary, 2008)

Internships - "A supervised work-based learning experience which links a learner with an employer for a planned set of activities often designed to give the learner a broad overview of a business or occupational field" (Glossary of Terms Related to Work Based Learning, 2003, p. 1).

Keyboard - An input device similar to a typewriter, for the entry of text, numbers, and punctuation. (The Tech Terms Computer Dictionary, n.d.)

Keyboarding - "Keyboarding is generally defined as the act of placing information into various types of equipment through use of a typewriter-like keyboard. Keyboarding produces copy which appears on a display screen and is recorded and stored in memory for later access or output. Keyboarding emphasizes input" (Bartholome, n.d., p. 1).

Proper technique - A method of keyboarding which both minimizes the danger of physical injuries to the keyboarder and helps with the improvement in keying speed and accuracy through skill application. (Zeitz, E., n.d.)

Psychomotor skill - A skill that requires a combination of muscle and mental activity. (MACMILLAN English Dictionary, n.d.)

QWERTY keyboard - The standard English language typewriter keyboard. Q W E R T Y are the letters on the top left, alphabetic row. Designed by Christopher Sholes, who invented the typewriter, the keyboard layout was organized to prevent people from typing too fast and jamming the keys. The QWERTY layout was included in the drawing for Sholes' patent application in 1878 (TechWeb, 2002, p. 1).

Software - Instructions for a computer, organized into sets called programs (Glossary of Computer Hardware and Micro-Scope, 2007).

Touch type - "Typing on a keyboard without looking at the keys. Touch typing has become an essential skill these days no matter what line of work anyone does" (TechWeb, 2002, p. 1).

Transcripted credit - "An actual technical college course, using college textbooks and materials, is taught to high school students. Students simultaneously earn high school and technical college credit" (Course offerings booklet, 2007, p.8).

Typewriting - "Typewriting involves the manipulation of keys on a standard typewriting keyboard with the emphasis on the typed copy or output. The output is produced on paper at the same time as the input is provided" (Bartholome, n.d., p. 1).

Words a minute (WAM) or Words per minute (WPM) - An acronym for words a minute. Used in keyboarding to find out how many words an individual can key during a one-minute timing. (AF Acronym Finder, n.d.)

Summary

With the recent elimination of the middle school keyboarding class in the year 2006-2007 and changes in keyboard instruction, the High School Business & Information Technology educators had little knowledge of the keyboarding competencies of incoming students enrolled in an elective 9-12th grade Information Processing (keyboarding) class.

Before the elimination of the middle school keyboarding class, several, but not all, of the current students signed up for Information Processing had been through this middle school instruction. Was there a need to re-teach the keyboard at the high school level?

Chapter One introduced the study. Chapters Two reviews the literature that addressed the problem. Chapter Three describes the methodology used in this study. Chapter Four analyzes the results of the study. Lastly, Chapter Five summarizes, concludes and provides recommendations for future actions.

Chapter II: Literature Review

Technology is changing and advancing constantly. "Various technologies-including biotechnology, nanotechnology (broadly defined), materials technology, and information technology-have the potential for significant and dominant global impacts by 2020" (Silberglitt et al., 2006, p. iii). Schools in the MAPS district will need to change and adjust their curriculum accordingly. "Because of rapid technological advancements, the business world, the public, and students will demand change in business education programs. Therefore, the leadership team must recognize that change is necessary to achieve program prominence" (Crites, 2006, p. 30-31). This chapter will describe the importance of proper keyboarding techniques as a core area in the business education curriculum and as an important life skill for students.

In an article in the NBEA Yearbook (2008), Lear & Zimmerman stated that "forecasts have been made that keyboarding will be supplemented by other input communication tools, not replaced by them" (p. 123). "Although many input devices are available that allow users to interact with the computer and communicate with others, the computer keyboard is still the most common method used to enter data" (Erthal & Zeliff, 2008, p. 106). The following studies infer that the ability to navigate a keyboard is becoming essential for personal and career success.

Fundamentals of Touch Typing

In the MAPS district, change has been apparent. One such change was in the area of keyboarding. According to Lubbe et al. (2006),

> it is recommended that the moment learners begin to use the computer keyboard as a writing tool, they should receive instruction in the correct posture and key-

> boarding skills and techniques, since incorrect keyboard techniques and habits, such as the hunt-and-peck method are difficult habits to break. (p. 1)

With the increase of computers in the elementary schools, the occurrence of touch typing was appearing in lower grades (Rogers et al., 2004). Touch typing was developed in the 1870s by Frank McGurrin and has been the most widely accepted method of typing (Bartholome, n.d.). This method of keyboarding, according to the authors at Renaissance Learning (2007),

> involves the use of all 10 fingers, each responsible for striking a group of diagonally situated keys on the keyboard, and using the right thumb on the space bar and the right pinkie finger for hard returns. It is also important that students do not look at the keyboard while striking the keys. (p. 3)

Keyboarding was primarily taught at the secondary level until 1986 in the MAPS district. In 1986, keyboarding and computers at MAPS were introduced to the seventh and eighth graders. In 1996, the introduction of computers was started in the third and fourth grades. During that time, computer usage was sporadic in the elementary schools. No formal keyboarding instruction had taken place (J. Bevier-North, personal communications, November 11, 2008). In the year 2002, seventh and eighth grade keyboarding was moved to the sixth grade level.

On September 13, 2004, a keyboarding training for fourth grade teachers was conducted by certified High Business Education Instructors (M. Konkol, personal communication, November 11, 2008). In September, 2005, another in-service for all elementary teachers took place. Shortly after, the introduction of computers and keyboarding

was introduced to kindergarten through third grade students. Unfortunately, in the year 2006-2007, all keyboarding classes in the middle school had been eliminated.

Keyboarding is currently introduced in the MAPS district by elementary teachers at the kindergarten level. Interesting, Anderson (2008), stated

> keyboarding in elementary schools is often taught or led by business educators. In many schools computer laboratory instructors teach keyboarding with assistance from business teachers, or business teachers act as advisors to computer laboratory instructors or classroom teachers. (p. 22)

In the MAPS district, in 1998, business educators had been asked for their recommendations relative to how to implement the elementary keyboarding program. No other interactions between the elementary teachers and the business education instructors had taken place until the 2004 and 2005 in-services.

In the MAPS district, at the kindergarten level, the students are introduced to the computer and the keyboard. No formal lessons in how to keyboard take place. It is more exploratory.

During first grade at MAPS, students are introduced to the homerow keys. These homerow keys are where the students place their fingers to begin keying: a s d f for the left hand and j k l ; for the right hand. The homerow keys are located in the middle row of the keyboard. The use of a computer program is not required. Interesting, Erthal & Zeliff (2008) state "although numerous keyboarding software programs are available, none can take the place of a qualified, skilled keyboarding teacher" (p. 112). However, in second grade at MAPS, students begin to learn how to touch type via a software program called *Type to Learn* without the guidance of a certified keyboarding instructor.

Type to Learn is a single focus program. Twenty-two lessons illustrate everything from proper posture and hand position, to the correct finger selection for every key on the keyboard, including the dreaded numbers and punctuation. With each lesson, there are also corresponding practice games and speed building exercises (www.superkids.com, p. 1).

During third through fifth grade at MAPS, additional lessons from *Type to Learn* are incorporated while reinforcing previously learned lessons. Erthal & Zeliff (2008) also state

> keyboarding is a psychomotor skill that should be learned and practiced. Just as athletes and musicians follow a prescribed method of learning, so should individuals who receive keyboarding instruction. Success in keyboarding depends on a sequence of instruction and methods including developing technique, practice/reinforcement, developing kinesthesis, learning stages and chaining, learning new keys, receiving feedback, developing speed, and refining accuracy. (p. 107)

In addition to learning keyboarding in third through fifth grades at MAPS, Information Technology Literacy Standards (ITLS) projects are also implemented. ITLS projects consist of graphic organizers, Internet explorer, Internet literacy, PowerPoint, scanner, Digital pictures, and video projects.

> Information and Technology Literacy is the ability of an individual, working independently or with others, to use tools, resources, processes, and systems responsibly to access and evaluate information in any medium, and to use that information to solve problems, communicate clearly, make informed decisions and

> construct new knowledge, products, or systems. (Wisconsin Department of Public Instruction, 2000, p. 1)

In the MAPS district, ITLS projects continue to be integrated in the core subject areas throughout the middle school years. However, since 2006-2007 school year, formal keyboarding lessons in the middle school were no longer available.

> The Wisconsin Model of Academic Standards for Information & Technology Literacy has developed an outline for grades pk-4 that includes keyboarding as part of their media and technology skills. Computer application, as well as key-boarding, is included in grades 5-8 under the media and technology category. In grades 9-12, other areas such as computer applications, desktop publishing, e-business, information processing, multimedia applications, and word process-ing/keyboarding are added to the category of media and technology (Wisconsin Department of Public Instruction, 2000).

The Importance of Strong Keyboarding Skills

The Alliance for Excellence in Education (working on behalf of the Carnegie Corporation of New York) recently published a report, 'Writing Next,' which outlined ways to improve the writing skills of middle and high school students. Renaissance Learning authors (2007) stated that

> Strong keyboarding skills play a major part in developing writing task. The level of keyboarding proficiency impacts how well students use word processors, a connection that may cause students to under-perform on writing tasks. Thus, as more states adopt computerized, high-stakes writing assessments it is crucial that

> students learn to keyboard proficiently prior to being evaluated on these types of writing tasks. (p. 2)

Not only is the skill of keyboarding important in the elementary, middle school, and high school level, but also in colleges and universities. With the growth of on-line classes, having this skill has an impact on whether some students are enrolling in on-line courses in post-secondary education or perhaps even in high school education. A study done by Flowers (2001) indicated that some students do not enroll in on-line classes because of computer issues such as being slow at the keyboard. The author went on to explain that these are "perceived obstacles, and students who enroll in online education may soon overcome a previously perceived obstacle" (p. 8).

Good keyboarding skills will help the students become successful, not only in their educational life, but potentially in their future employment. In a website hosted by BBC (2008), the authors state that

> good keyboarding skills are an advantage in today's world. Being able to type quickly can save you time and money, whether you're at home, school, college or university. Good keyboard skill (also known as "touch typing") is an advantage whether you're surfing the net, chatting online or preparing work. (p. 1)

Also, in an article published by Renaissance Learning (2007), the authors stated "clearly, students who enter the workforce with competent typing skills are desirable to employers in both the public and private sectors" (p. 2). Lubbe et al. (2006) stated that

> technological progress and development has not only resulted in information being made available faster and easier, but it has put more pressure on computer users to develop skills (such as keyboard and computer skills) in order to best utilize

the technology and to improve communication, for example, in the use of e-mail. (p. 1)

Hoggatt (1998) believed "a successful keyboarding program provides students with the skills and knowledge needed to function effectively in today's business environment, as well as the skills needed in their personal lives to function in a complex and rapidly changing world" (p. 34). In a recent study, students were asked "what skills do you think are necessary for a career in information technology? Keyboarding was the number one choice of both girls and boys followed by computer skills and programming" (Gupta & Houtz, 2000, p. 4).

In addition, Toppe (1991) described keyboarding as an "enabling skill - a tool needed by almost every American worker in all types of companies and at every level in the hierarchy of these companies" (p. 23). According to Weber (2004)

> in some schools, typing classes disappeared at least a couple of decades ago. A skill that once seemed vital particularly to prepare young women for secretarial jobs - no longer appeared relevant in an age that urged more kids to consider going on to at least some form of higher education. And yet, argue some teachers, the ability to touch-type - or to "keyboard," the term more often used today - has perhaps never been more essential. (p. 1)

According to The Digest of Education Statistics (2004), of the workers 18 years old and over, 57.9 percent are using the computer on the job for word processing/desktop publishing applications, 56 percent are using the computer on the job for spreadsheet applications, and 75.4 percent are using the computer on the job for Internet/e-mail. According to Hoggatt (1998), "in order to learn and apply spreadsheet, database, and word

processing applications most effectively, superior inputting (keyboarding) skills are essential. Keyboarding is a basic literacy skill" (p. 35).

Hawkins (2004) conducted research to determine if a "person's ability or non-ability to type properly has played a roll in the productiveness of their vocational careers" (p. 2). At the conclusion of this research, Hawkins (2004) continues to state

> keyboarding skills are important to have in our age of computers. Parents and students are saying that having these skills does make them productive. The student use of proper keyboarding skills has helped them while using e-mail and instant messenger. Many of them said that having proper keyboarding skills has made them faster in communicating with instant messenger. They also said it helps them when using the Internet" (p. 19).

Hawkins (2004) continues to affirm

> perhaps proper keyboarding skills should be taught to students as early as 5th grade because of their early use of computers. However, high school students should revisit this skill to fine tune it so they can be sure to develop their skill in order to do more advanced projects like science labs, social study projects, English papers, and prepare them for college and the workplace. (p. 20)

Is this basic literacy skill being met by the end of the 12th grade in the MAPS district? If these basic skills are being met, there is no need to re-teach keyboarding skills at the high school level. This in turn would free up time for the learning and mastery of more sophisticated, technologically advanced skills in software programs. Perreault (2004) stated that

> Business educators are devoted to helping students develop the skills and attributes required in the workplace. As computers became a standard business tool used by employees to complete workplace tasks, business educators responded by adjusting the curriculum to include computer applications. (p. 52)

An adjustment in the curriculum, therefore, would allow other requirements of the Wisconsin State Standards in Business Education and the Wisconsin's Model Academic Standards for Information & Technology Literacy to be implemented.

Chapter Three of this paper will describe the methodology used in the study. Chapter Four will identify the results and Chapter Five will summarize, conclude and provide recommendations for future actions.

Chapter III: Methodology

With the recent reorganization of the MAPS district and changes in keyboard instruction, the High School Business & Information Technology educators were not aware of the keyboarding competencies of incoming students enrolled in an elective 9-12th grade Information Processing (keyboarding) class. Would students demonstrate sufficient keyboarding skills for the Business & Information Technology teachers to proceed to more advanced computer applications?

This information was necessary for the MAPS district to meet the Wisconsin DPI Model of Academic Standards for Business Education and the Wisconsin's Model Academic Standards for Information & Technology Literacy.

This chapter includes information about how the sample was selected, a description of the subject selection, and the instrument used. In addition, procedures for data collection and data analysis are given and will conclude with some limitations to the study.

Subject Selection and Description

The subjects used for this study included current business education students at Merrill High School enrolled in a Fall, 2008 Information Processing (keyboarding) classes in grades 9-12. Participation in the Information Processing survey was voluntarily. A consent form and cover letter were mailed home before the first day of class for each student. Of the approximately 1,157 students at the high school, 38 students signed up for this elective class.

Thirty eight consent forms were sent home giving authority for the student to participate in the study. The researcher then accumulated a list of students who were eligible

to complete the survey and gave the list to the Information Processing teacher. These students could then be released to the researcher to conduct the survey. Only 14 of the 38 students enrolled had been given consent by their guardian or parent to participate in the survey.

Instrumentation

To determine the keyboarding competencies and psychomotor competencies of students entering Information Processing I, a 40-question survey was created by the researcher to gather data from the pre-selected participants. To help determine these questions, the researcher had reviewed another related survey (Skifstad, 2003). Additional information gathered from the instrument helped determine if there was a difference in knowledge and psychomotor competencies based on demographic factors such as gender, age, previous courses, and if the student had a computer at home. Other factors, including the elementary school and middle school the student had attended, were also included in the instrument.

In addition, a speed test was administered as part of the survey to help determine the students' WAM and psychomotor competencies. The Wisconsin's Model Academic Standards for Information & Technology Literacy states "by the end of grade 12, students will demonstrate proper keyboarding mechanics and touch type accurately (suggested range 30-35 WAM)" (Wisconsin DPI, 2002, p. 8).

Since this survey was intended purposely for this study, no measures of validity and reliability have been documented. However, one eighth grade student took the survey instrument prior to administering the instrument to the volunteer participants. The researcher was then informed of questions that were hard to comprehend. Changes were

made as a result of the student reviewing the survey. That was the only pilot test administered.

Data Collection Procedures

A 40-question survey and a skills test (timed typing test) were administered by the investigator. The teacher was given a list of students who were qualified to take the survey and the students were released to the investigator to take the survey in the Career Center. The survey was administered in a well-lit computer (Career Center) room. The investigator read the instructions of the survey to the participants and asked them if there were any questions. The participants were given the chance to look at their computer keyboard to answer any of the questions.

Data Analysis

As a result of the descriptive nature of the study, all appropriate descriptive statistics were ran on the data to address the research questions.

Limitations

There were several limitations to this study that included:

1. This research was limited to those students who enrolled in an elective Information Processing class at Merrill High School in the MAPS district. Merrill High School had an enrollment of 1,157 in grades 9-12, of which 38 students were enrolled in the Information Processing I classes. Only 14 students participated in the survey.
2. The skills assessment given to students was administered by the researcher. Complete impartiality could be questioned.

3. This study was for informational purposes only and did not include considerations of revisions to the keyboarding program at the elementary or middle school level in the MAPS district. The study does take into consideration changing district-wide keyboarding curriculum. It approaches any potential change at the high-school level only.
4. A survey developed by the investigator was used. The presence of the human element indicates that the survey may contain misinterpretations, misstatements, or omissions not intended by the investigator.

The remaining chapters of this paper will identify the results (findings), establish some conclusions from the study, and will outline some potential recommendations.

Chapter IV: Results

This research was an analysis to determine the need to re-teach the keyboard at the high school level in Merrill, Wisconsin. A total of 38 students in grades 9 thru 12 signed up for the elective class Information Processing I. Of the 38 students, a total of 14 students were selected to participate in this study. This data was then evaluated by the researcher.

The survey consisted of 40 questions and two timed writings that attempted to answer the following research questions:

1. What are the keyboarding knowledge competencies of students entering Information Processing I? Corresponding Survey Questions 11 through 40.
2. What are the keyboarding psychomotor competencies of students entering Information Processing I? Corresponding Timings 1 and 2.
3. What is the difference in knowledge and psychomotor competencies based on selected demographic factors (gender, age, previous courses, computer at home)? Corresponding Survey Questions 1, 6, 8, and 9.
4. What is the difference in knowledge and psychomotor competencies based on the elementary school (private or public) they attended? Corresponding Survey Questions 2, 3, and 4.
5. What is the difference in knowledge and psychomotor competencies based on the middle school (private or public) they attended? Corresponding Survey Questions 5 and 7.

Item Analysis

Survey Question #1: The first question was a demographics multiple choice question that focused on grade level and gender. (See Appendix C for sample of survey). The participants were asked to place an "X" on the line that described them. One (7.1%) was a 9th grade girl, 1 (7.1%) was a 10th grade girl, 3 (21.4%) were 12th grade girls, 6 (42.9%) were 9th grade boys, 1 (7.1%) was a 10th grade boy, and 2 (14.3%) were 11th grade boys.

Survey Question #2: The second survey question also focused on demographics of the students and asked if they had attended elementary school in Merrill. There were 11 (78.6%) of the students that had attended Merrill and 3 (21.4%) that had not.

Survey Question #3: The third survey question focused on demographics as well asking the participants if the answer to question #2 was yes, which elementary school they had attended. One (7.1%) attended Jefferson elementary, 4 (28.6%) attended Maple Grove elementary, 1 (7.1%) attended Pine River elementary, 2 (14.3%) attended St. John's Church elementary school, 2 (14.3%) attended Washington elementary, and 1 (7.1%) had attended both St. John's and Kate Goodrich elementary schools.

Survey Question #4: The fourth question also pertained to demographics and asked if the answer to #2 was no, where had they attended elementary school. Three (21.4%) listed other towns or states for their answers. Of the three, one had attended elementary school in Las Vegas, Nevada. Another had attended elementary school in Fresno, California. The third had attended elementary school in Gleason, Wisconsin.

Survey Question #5: Participants were asked if they had attended Prairie River Middle School (PRMS) in Merrill. Eleven (78.6%) had attended PRMS and 3 (21.4%) had not attended PRMS.

Survey Question #6: The sixth question asked the participants if the answer to #5 was yes, had they taken 8th grade Computer Applications class. Of the 14 participants, 11 students were able to answer this question. Six (54.5%) had answered yes and 5 (45.5%) had answered no.

Survey Question #7: This question asked if the answer to #5 was no to list the name of the school, city and state where they attended middle school. One student answered Pine Ridge in Auberry, California. Two students had answered St. John's in Merrill, Wisconsin.

Survey Question #8: This question also focused on demographics and asked the participants if they had taken the high school course Computer Applications I. Two (14.3%) had answered yes and 12 (85.7%) had answered no.

Survey Question #9: Participants were asked if they use a computer at home. Fourteen (100%) use a computer at home.

Survey Question #10: The tenth question asked the participants why did they take or plan to take Information Processing I. They could check all of the reasons that applied.

The participants chose personal interest, parents, and others for their answers. The descriptive statistics is listed in Table 1 and Table 2.

Table 1

Reasons for Taking (or Planning to Take) Information Processing I

Choices	Response	Percent
Personal Interest	8	57.14%
Guidance Counselor	1	7.14%
Parents	7	50.00%
Curiosity	1	7.14%
Teacher(s)	1	7.14%
Course Description Guide	4	28.57%
Friend Taking the Course	1	7.14%
Friends or relatives took keyboarding class	2	14.29%
Other	9	64.29%
	34	

Table 2

Other Text Category Breakdown of Answers

Other Responses	Responses	Percent
Get Better at typing	1	7.14%
Good for a career in business	1	7.14%
Learn to type faster	1	7.14%
Need to get better at typing	1	7.14%
Thought it would be easy	2	14.29%
To be good at keyboarding	1	7.14%
To Type faster	1	7.14%
To work in school library	1	7.14%
	9	

The next 30 survey questions (Questions 11- 40) attempted to answer the following research questions of "what are the keyboarding knowledge competencies of students entering Information Processing I?" The students were allowed to look at the keyboard and informed that left hand homerow finger placement was ASDF and right hand homerow finger placement was JKL; .

Survey Question #11 asked which homerow finger strikes the letter A. The participants were asked to reply indicating what the correct homerow finger should be and what actual finger they use. All 14 (100%) "actually use" the homerow finger A to strike A. All 14 (100%) knew they "should use" the homerow finger A to strike A.

Survey Question #12: Participants were asked which homerow finger strikes the letter B. Ten (71.4%) answered correctly F for "actually use" and "should use". One (7.1%) answered incorrectly A for both "actually use" and "should use," and 3 (21.4%) answered incorrectly J for both "actually use" and "should use".

Survey Question #13: This question asked which homerow finger strikes the letter C. Eleven (78.6%) answered incorrectly F for the "actually use". Three (21.4%) answered correctly D for "actually use". Nine (64.3%) answered correctly D for "should use" and 5 (35.7%) answered incorrectly F for "should use".

Survey Question #14: This question asked which homerow finger strikes the letter D. Fourteen (100%) answered correctly D as "actually use" and "should use".

Survey Question #15: This question asked which homerow finger strikes the letter E. One (7.1%) answered incorrectly F for "actually use" and 13 (92.9%) answered correctly D for "actually use". Fourteen (100%) answered correctly D for "should use".

Survey Question #16: This question asked which homerow finger strikes the letter F. Fourteen (100%) answered correctly F for both "actually use" and "should use".

Survey Question #17: This question asked which homerow finger strikes the letter G. Fourteen (100%) answered correctly F for both "actually use" and "should use".

Survey Question #18: This question asked which homerow finger strikes the letter H. Fourteen (100%) answered correctly J for both "actually use" and "should use".

Survey Question #19: This question asked which homerow finger strikes the letter I. Twelve (75.7%) answered correctly K for "actually use," 1 (7.1%) answered incorrectly J for "actually use," and 1 (7.1%) answered incorrectly L for "actually use". Fourteen (100%) answered correctly K for "should use".

Survey Question #20: This question asked which homerow finger strikes the letter J. Fourteen (100%) answered correctly J for "actually use" and "should use".

Survey Question #21: This question asked which homerow finger strikes the letter k. Thirteen (92.9%) answered correctly K for "actual use" and 1 (7.1%) answered incorrectly J for "actual use". Fourteen (100%) answered correctly K for "should use".

Survey Question #22: This question asked which homerow finger strikes the letter L. Thirteen (92.9%) answered correctly L for "actually use" and 1 (7.1%) answered incorrectly K for "actually use". Fourteen (100%) answered correctly L for "should use".

Survey Question #23: This question asked which homerow finger strikes the letter M. Eleven (78.6%) answered correctly J for "actually use" and 3 (21.4%) answered incorrectly K for "actually use". Nine (64.3%) answered correctly J for "should use," and 5 (35.7%) answered incorrectly K for "should use".

Survey Question #24: This question asked which homerow finger strikes the letter N. Fourteen (100%) answered correctly J for "actually use" and "should use".

Survey Question #25: This question asked which homerow finger strikes the letter O. Twelve (85.7%) answered correctly L for "actually use," 1 (7.1%) answered incorrectly K for "actually use," and 1 (7.1%) answered incorrectly O for "actually use". Thirteen (92.9%) answered correctly L for "should use" and 1 (7.1%) answered incorrectly O for "should use".

Survey Question #26: This question asked which homerow finger strikes the letter P. Ten (71.4%) answered correctly; (sem) for "actually use," 3 (21.4%) answered incorrectly L for "actually use," and 1 (7.1%) answered incorrectly K for "actually use". Thirteen (92.9%) answered correctly ;(sem) for "should use" and 1 (7.1%) answered incorrectly L for "should use".

Survey Question #27: This question asked which homerow finger strikes the letter Q. Eleven (78.6%) answered correctly A for "actually use," 2 (14.3%) answered incorrectly S for "actually use," and 1 (7.1%) answered incorrectly D for "actually use". Fourteen (100%) answered correctly A for "should use".

Survey Question #28: This question asked which homerow finger strikes the letter R. Twelve (85.7%) answered correctly F, 1 (7.1%) answered incorrectly D, and 1 (7.1%) answered incorrectly R for both "actually use" and "should use".

Survey Question #29: This question asked which homerow finger strikes the letter S. Thirteen (92.9%) answered correctly S for "actually use" and 1 (7.1%) answered incorrectly D for "actually use". Fourteen (100%) answered correctly S for "should use".

Survey Question #30: This question asked which homerow finger strikes the letter T. Fourteen (100%) answered correctly F for both "actually use" and "should use".

Survey Question #31: This question asked which homerow finger strikes the letter U. Fourteen (100%) answered correctly J for both "actually use" and "should use".

Survey Question #32: This question asked which homerow finger strikes the letter V. Twelve (85.7%) answered correctly F for "actually use," 1 (7.1%) answered incorrectly S for "actually use," and 1 (7.1%) answered incorrectly V for "actually use". Thirteen (92.9%) answered correctly F for "should use" and 1 (7.1%) answered incorrectly V for "should use".

Survey Question #33: This question asked which homerow finger strikes the letter W. Thirteen (92.9%) answered correctly S for "actually use," and 1 (7.1%) answered incorrectly D for "actually use". Fourteen (100%) answered correctly S for "should use".

Survey Question #34: This question asked which homerow finger strikes the letter X. Five (35.7%) answered correctly S for "actually use," 7 (50.0%) answered incorrectly D for "actually use," 1 (7.1%) answered incorrectly A for "actually use," and 1 (7.1%) answered incorrectly J for "actually use". Eleven (78.6%) answered correctly S for "should use," 2 (14.3%) answered incorrectly D for "should use," and 1 (7.1%) answered incorrectly A for "should use".

Survey Question #35: This question asked which homerow finger strikes the letter Y. Twelve (85.7%) answered correctly J for "actually use," 1 (7.1%) answered incorrectly F for "actually use," and 1 (7.1%) answered incorrectly A for "actually use". Fourteen (100%) answered correctly J as for "should use".

Survey Question #36: This question asked which homerow finger strikes the letter Z. Eleven (78.6%) answered correctly A for "actually use," 2 (14.3%) answered incorrectly S for "actually use," and 1 (7.1%) answered incorrectly D for "actually use". Fourteen (100%) answered correctly A for "should use".

Survey Question #37: This question asked which homerow finger strikes the enter key? Eleven (78.6%) answered correctly ; (sem) for "actually use," 2 (14.3%) answered incorrectly K for "actually use" and 1 (7.1%) answered incorrectly D for "actually use". Fourteen (100%) answered correctly ; (sem) for "should use."

Survey Question #38: This question asked which homerow finger strikes the ;(sem). Thirteen (92.9%) answered correctly ; (sem) for "actually use" and 1 (7.1%) answered incorrectly D for "actually use". Fourteen (100%) answered correctly ; (sem) for "should use".

Survey Question #39: This question asked which homerow fingers strikes the letter capital F? Five (35.7%) answered correctly ;(sem)/F for "actually use," 7 (50%) answered incorrectly a/f for "actually use," 1 (7.1%) answered incorrectly k/f for "actually use," and 1(7.1%) answered incorrectly ;/; for "actually use". Seven (50%) answered incorrectly A/F for "should use," 6 (42.9%) answered correctly ;(sem)/F for "should use," and 1 (7.1%) answered incorrectly F/F for "should use".

Survey Question #40: This question asked which homerow fingers strikes the letter capital J? Five (35.7%) answered correctly A/J for "actually use," 7 (50.0%) answered incorrectly ;/J for "actually use," 1 (7.1%) answered incorrectly A/A for "actually use," and 1 (7.1%) answered incorrectly D/J for "actually use". Six (42.9%) answered correctly A/J for "should use," 6 (42.9%) answered incorrectly ;/J for "should use," 1

(7.1%) answered incorrectly J/J for "should use," and 1 (7.1%) answered incorrectly L/J for "should use".

The survey attempted to answer the research question regarding keyboarding knowledge competencies of students entering Information Processing I. Do the students know which homerow fingers they should be using to strike the various keys? The following data statistics will provide information that will aid in this analysis.

Tables 3 through 6 indicate data collected on survey questions 11 through 40 with no reference to demographics.

Table 3 indicates the number answered correctly on the survey pertaining to the 30 questions asking which homerow finger "should be used".

Table #3

Total Number of "Should Be Used" Answered Correctly

Number answered correctly	Number of Students	Percent
25	2	14.3%
26	2	14.3%
27	5	35.7%
28	2	14.3%
29	1	7.1%
30	2	14.3%
Total	14	100%

On the surface the data in this table could be looked at positively. All 14 students knew the proper finger that "should be used" in 25 of 30 keystrokes with 2 students knowing all 30.

However, when compared with the actual finger they use in the following tables, the results changed significantly.

Table 4 breaks down each letter of the alphabet to analyze if the participants knew which homerow finger they should use and the homerow finger they actually use.

Table #4

Identifying Alphabet Keystrokes on the Keyboard Should vs. Actual

Alphabet on Keyboard	Frequency of Correct Answers for "Should Use"	Frequency of Correct Answers for "Actually Use"
a	14 (100%)	14 (100%)
b	10 (71.4%)	10 (71.4%)
c	9 (64.3%)	3 (21.4%)
d	14 (100%)	14 (100%)
e	14 (100%)	13 (92.9%)
f	14 (100%)	14 (100%)
g	14 (100%)	14 (100%)
h	14 (100%)	14 (100%)
i	14 (100%)	12 (85.7%)
j	14 (100%)	14 (100%)
k	14 (100%)	13 (92.9%)
l	14 (100%)	13 (92.9%)
m	9 (64.3%)	11 (78.6%)
n	14 (100%)	14 (100%)
o	13 (92.9%)	12 (85.7%)
p	13 (92.9%)	10 (71.4%)
q	14 (100%)	11 (78.6%)

r	12 (85.7%)	12 (85.7%)
s	14 (100%)	13 (92.9%)
t	14 (100%)	14 (100%)
u	14 (100%)	14 (100%)
v	13 (92.9%)	12 (85.7%)
w	14 (100%)	13 (92.9%)
x	11 (78.6%)	5 (35.7%)
y	14 (100%)	12 (85.7%)
z	14 (100%)	11 (78.6%)
ENTER	14 (100%)	11 (78.6%)
; (sem)	14 (100%)	13 (92.9%)
Capital F	6 (42.9%)	5 (35.7%)
Capital J	6 (42.9%)	5 (35.7%)

In analyzing the results of the above table, all 14 participants answered correctly on 20 (66.66%) of the 30 keystroke questions asking which homerow finger they should be using. Conversely, all participants only answered correctly on 9 (30%) of the 30 key-stroke questions asking which homerow finger they actually use. When looking at the actual homerow finger placement (A,S,D,F,J,K,L,;) all 14 participants (100%) answered correctly on the homerow finger they "should use" and 13 participants (92.9%) answered correctly on the homerow finger they "actually use." One may expect near perfect results on the actual homerow keys.

Table 5 reports the frequency with which the students "actually use" the proper homerow finger being the same as "should be used" homerow finger pertaining to the 30 questions on the survey.

Table #5

Total Number of "Actually Use" Finger Same As "Should Be Used"

Total number of actual finger use same as correct finger out of 30	Frequency	Percent
15	1	7.1
22	1	7.1
24	2	14.3
25	3	21.4
26	4	28.6
27	2	14.3
28	1	7.1
Total	14	100%

It should be noted that none of the participants had used the proper homerow finger on all 30 keystrokes tested.

Table 6 reports the participant's knowledge of the correct homerow finger that "should be used" versus the homerow finger they "actually use" on the survey's 30 questions pertaining to proper placement.

Table #6

Total Number of Actually Use Correct vs. Total Number Should Use Correct

		Total Should Use Correct (out of a possible 30)						
Total Actually Use		25	26	27	28	29	30	Total
Correct (out of a	15	0	0	0	0	0	1	1
possible 30)	22	0	0	1	0	0	0	1
	24	0	0	2	0	0	0	2
	25	2	1	0	0	0	0	3
	26	0	1	0	2	1	0	4
	27	0	0	2	0	0	0	2
	28	0	0	0	0	0	1	1
	Total	2	2	5	2	1	2	14

The table indicates that for the students that knew all of the correct homerow fingers keystokes (30/30), one of them only used the correct homerow finger on 15 of the keystrokes and one of them used the correct homerow finger on 28 of the keystrokes. For the two students who knew 25/30 of the correct homerow finger keystrokes, both also used 25/30 of the correct homerow finger keystrokes.

In trying to answer the question "do the students know which homerow fingers they should be using to strike the various keys," it must be noted that the mean for the total number of "actual" finger use same as correct finger use was only 24.71, whereas the mean for the knowledge of which homerow finger "should be" used was 27.29 out of 30 possible.

To answer the research question of what the keyboarding psychomotor competencies of students entering Information Processing I, two timings were administered. The average net words per minute for Timing 1 was 23.50. For Timing 2, the average speed was also 23.50. Tables 7 through 9 outline the results of the timings.

Table #7

Individual Net Words Per Minute for Timing 1

WAM	Frequency	Percent	Valid Percent	Cumulative Percent
7	1	7.1	7.1	7.1
8	1	7.1	7.1	14.3
10	2	14.3	14.3	28.6
14	1	7.1	7.1	35.7
15	1	7.1	7.1	42.9
19	1	7.1	7.1	50.0
21	1	7.1	7.1	57.1
24	1	7.1	7.1	64.3
27	1	7.1	7.1	71.4
35	1	7.1	7.1	78.6
44	1	7.1	7.1	85.7
47	1	7.1	7.1	92.9
48	1	7.1	7.1	100.0
Total	14	100	100	

Table #8

Individual Net Words Per Minute for Timing 2

WAM	Frequency	Percent	Valid Percent	Cumulative Percent
2	1	7.1	7.1	7.1
6	1	7.1	7.1	14.3
10	2	14.3	14.3	28.6
14	1	7.1	7.1	35.7
16	1	7.1	7.1	42.9
17	1	7.1	7.1	50.0
19	1	7.1	7.1	57.1
21	1	7.1	7.1	64.3
26	1	7.1	7.1	71.4
44	1	7.1	7.1	78.6
47	1	7.1	7.1	85.7
48	1	7.1	7.1	92.9
49	1	7.1	7.1	100.0
Total	14	100%	100%	

Table #9

Average of Timing #1 and Timing #2

WAM	Frequency	Valid Percent	Cumulative Percent
4.50	1	7.1	7.1
7	1	7.1	14.3
10	1	7.1	21.4
12	1	7.1	28.6
13	1	7.1	35.7
16.50	1	7.1	42.9
17	1	7.1	50.0
20.50	1	7.1	57.1
21	1	7.1	64.3
26.50	1	7.1	71.4
41	1	7.1	78.6
44	1	7.1	85.7
47.50	1	7.1	92.9
48.50	1	7.1	100.0
Total	14	100.0	

The average words a minute for all participants was 23.50 with a low total of 4.50 WAM and a high total of 48.50 WAM. Wisconsin DPI suggested range by the end of grade 12 is 30-35 WAM. Four of the 14 participants fall in that range.

All of the remaining tables (Tables 10 through 23) include data collected from the 40-question survey with the influence of demographic factors.

When determining what the difference in knowledge and psychomotor competencies based on selected demographic factors (gender, age, previous courses, computer at home), there were not enough data points for statistical testing. However, several inferences may be implied from the data collected based on various demographic factors.

There were 9 males (64.3%) and 5 females (35.7%) who took the survey. Tables 10 and 11 outline the gender differences when asked which homerow finger "should be

used" and which homerow finger is "actually used" on the keystroke questions in the survey.

Table #10

Gender Difference in Number of "Should Be Using" Answered Correctly

Gender	Total number of should be using got correct	Frequency	Percent
Male	25	1	11.1
	26	2	22.2
	27	3	33.3
	28	1	11.1
	29	1	11.1
	30	1	11.1
	Total	9	100.0
Female	25	1	20.0
	27	2	40.0
	28	1	20.0
	30	1	20.0
	Total	5	100.0

*Data conclusion on Table 13.

Table #11

Gender Difference in Total Number of "Actual Using" Answered Correctly

Gender	Total number of actual finger use same as correct finger	Frequency	Percent
Male	15	1	11.1
	22	1	11.1
	24	1	11.1
	25	2	22.2
	26	3	33.3
	27	1	11.1
	Total	9	100.0
Female	24	1	20.0
	25	1	20.0
	26	1	20.0
	27	1	20.0
	28	1	20.0
	Total	5	100.0

*Data conclusion on Table 13.

Table12 outlines the average timing differences based on gender.

Table #12

Average Timing Differences Based on Gender

Gender	WAM	Frequency	Percent
Male	4.5	1	11.1
	7	1	11.1
	12	1	11.1
	13	1	11.1
	17	1	11.1
	21	1	11.1
	26.5	1	11.1
	44	1	11.1
	48.5	1	11.1
	Total	9	100.0
Female	10	1	20.0
	16.5	1	20.0
	20.5	1	20.0
	41	1	20.0
	47.5	1	20.0
	Total	5	100.0

*Data conclusion on Table 13.

Only two participants from each gender had met the suggested range of 30-35 WAM as outlined by Wisconsin DPI.

Table 13 shows the mean score of homerow finger knowledge and the timing results broken down by gender.

Table # 13

Mean Scores of Tables 10, 11 and 12

Gender			total number of should be using got correct	total number of actual finger use same as correct finger	Timing #1 (Net words per minute)	Timing #2 (Net words per minute)	Avg time
male	N	Valid	9	9	9	9	9
		Missing	0	0	0	0	0
	Mean		27.2222	24.0000	21.56	21.44	21.5000
	Std. Deviation		1.56347	3.67423	15.257	16.094	15.58244
female	N	Valid	5	5	5	5	5
		Missing	0	0	0	0	0
	Mean		27.4000	26.0000	27.00	27.20	27.1000
	Std. Deviation		1.81659	1.58114	14.370	18.700	16.26115

When comparing the two genders with the total number of "should be using" answered correctly, the males averaged 27 out of 30 (90%) correct as did the females. However, when analyzing the total number of "actual finger use" same as correct finger, the males averaged 24 out of the 30 (80%) whereas the females averaged 26 out of the 30 correct (87%). The males averaged 21.50 WAM where the females averaged 27.10 WAM on the timings. The results were the same for the second timing (timing #2). It appears that girls are more likely to use the right finger to type faster.

The following tables help determine if age made a difference in knowing and using the correct homerow finger for keystrokes. Tables 14 and 15 outline the results. The surveys were split into two grade levels: 9th grade and 10th grade and above.

Table #14

Total Number of Should Be Using Answered Correctly

Grade Category			Frequency	Percent
9th grade	Valid	25	1	14.3
		26	2	28.6
		27	3	42.9
		29	1	14.3
		Total	7	100.0
10th, 11th, 12th grade	Valid	25	1	14.3
		27	2	28.6
		28	2	28.6
		30	2	28.6
		Total	7	100.0

Table #15

Total Number of Actual Finger Use Same As Correct Finger

Grade Category			Frequency	Percent
9th grade	Valid	22	1	14.3
		24	1	14.3
		25	2	28.6
		26	2	28.6
		27	1	14.3
		Total	7	100.0
10th, 11th, 12th grade	Valid	15	1	14.3
		24	1	14.3
		25	1	14.3
		26	2	28.6
		27	1	14.3
		28	1	14.3
		Total	7	100.0

The 9th grade participants averaged 25 (out of 30) survey questions correct for "actual" finger same as correct finger whereas upper class participants averaged 24.43 on the same survey questions. Grade level does not appear to make a difference in correct homerow finger keystroking.

Tables 16, 17 and 18 study age difference in regards to speed (words per minute). The surveys were split into two grade levels: 9th grade and 10th grade and above.

Table #16

Timing #1 (Net Words Per Minute)

Grade Category			Frequency	Percent	Valid Percent	Cumulative Percent
9th grade	Valid	10	2	28.6	28.6	28.6
		14	1	14.3	14.3	42.9
		15	1	14.3	14.3	57.1
		21	1	14.3	14.3	71.4
		27	1	14.3	14.3	85.7
		48	1	14.3	14.3	100.0
		Total	7	100.0	100.0	
10th-12th grade	Valid	7	1	14.3	14.3	14.3
		8	1	14.3	14.3	28.6
		19	1	14.3	14.3	42.9
		24	1	14.3	14.3	57.1
		35	1	14.3	14.3	71.4
		44	1	14.3	14.3	85.7
		47	1	14.3	14.3	100.0
		Total	7	100.0	100.0	

Table #17

Timing #2 (Net Words Per Minute)

Grade Category			Frequency	Percent	Valid Percent	Cumulative Percent
9th grade	Valid	10	2	28.6	28.6	28.6
		16	1	14.3	14.3	42.9
		19	1	14.3	14.3	57.1
		21	1	14.3	14.3	71.4
		26	1	14.3	14.3	85.7
		49	1	14.3	14.3	100.0
		Total	7	100.0	100.0	
10^{th}-12^{th} grade	Valid	2	1	14.3	14.3	14.3
		6	1	14.3	14.3	28.6
		14	1	14.3	14.3	42.9
		17	1	14.3	14.3	57.1
		44	1	14.3	14.3	71.4
		47	1	14.3	14.3	85.7
		48	1	14.3	14.3	100.0
		Total	7	100.0	100.0	

Table #18

Average Words Per Minute Based on Grade Category

Grade Category			Frequency	Percent	Valid Percent	Cumulative Percent
9th grade	Valid	10	1	14.3	14.3	14.3
		12	1	14.3	14.3	28.6
		13	1	14.3	14.3	42.9
		17	1	14.3	14.3	57.1
		21	1	14.3	14.3	71.4
		26.5	1	14.3	14.3	85.7
		48.5	1	14.3	14.3	100.0
		Total	7	100.0	100.0	
10^{th}-12^{th} grade	Valid	4.5	1	14.3	14.3	14.3
		7	1	14.3	14.3	28.6
		16.5	1	14.3	14.3	42.9
		20.5	1	14.3	14.3	57.1
		41	1	14.3	14.3	71.4
		44	1	14.3	14.3	85.7
		47.5	1	14.3	14.3	100.0
		Total	7	100.0	100.0	

The 9th grade participants averaged 21 WAM whereas the upper class participant's averaged 25.5 WAM. It appears the upper class experience may result in a very slight increase in keystroke speed; however, the number of participants makes it difficult to prove this assumption. It is interesting to note that the participant with the best WAM average was in ninth grade. It is also interesting to note that only 3 of the 7 upper class participants were meeting Wisconsin DPI suggested 30-35 WAM.

The remaining tables study whether prior computer applications classes had an impact on the participant's survey question results. Survey Question #6 and #8 both pertained to taking either the 8th grade computer applications class or high school computer applications class. The only item that was analyzed to answer this question were the responses to survey question #6 since the vast majority of respondents had not taken a high school computer applications course. It should be noted that application classes do not teach keyboarding techniques.

Tables 19 and 20 report the results of participants who took an 8th grade computer applications class versus those who did not in reference to knowing and using the correct homerow finger for keystrokes.

Table #19

Total Number of Should Be Using Answered Correctly

8th Grade Computer Apps Class			Frequency	Percent	Valid Percent	Cumulative Percent
no	Valid	25	1	20.0	20.0	20.0
		26	1	20.0	20.0	40.0
		27	2	40.0	40.0	80.0
		30	1	20.0	20.0	100.0
		Total	5	100.0	100.0	
yes	Valid	25	1	16.7	16.7	16.7
		26	1	16.7	16.7	33.3
		27	2	33.3	33.3	66.7
		28	1	16.7	16.7	83.3
		29	1	16.7	16.7	100.0
		Total	6	100.0	100.0	

*Data conclusion on Table 24.

Table #20

Total Number of Actual Finger Use Same as Correct Finger

8th Grade Computer Apps Class			Frequency	Percent	Valid Percent	Cumulative Percent
no	Valid	25	2	40.0	40.0	40.0
		27	2	40.0	40.0	80.0
		28	1	20.0	20.0	100.0
		Total	5	100.0	100.0	
yes	Valid	24	2	33.3	33.3	33.3
		25	1	16.7	16.7	50.0
		26	3	50.0	50.0	100.0
		Total	6	100.0	100.0	

*Data conclusion on Table 24.

Tables 21-23 report the results of participants attending 8th grade computer application class versus the participants that had not attended the same class in regards to speed (words per minute).

Table #21

Timing #1 (Net words per minute)

8th Grade Computer Apps Class			Frequency	Percent	Valid Percent	Cumulative Percent
no	Valid	8	1	20.0	20.0	20.0
		21	1	20.0	20.0	40.0
		24	1	20.0	20.0	60.0
		27	1	20.0	20.0	80.0
		47	1	20.0	20.0	100.0
		Total	5	100.0	100.0	
yes	Valid	10	2	33.3	33.3	33.3
		15	1	16.7	16.7	50.0
		19	1	16.7	16.7	66.7
		35	1	16.7	16.7	83.3
		48	1	16.7	16.7	100.0
		Total	6	100.0	100.0	

*Data conclusion on Table 24.

Table #22

Timing #2 (Net words per minute)

8th Grade Computer Apps Class			Frequency	Percent	Valid Percent	Cumulative Percent
no	Valid	6	1	20.0	20.0	20.0
		17	1	20.0	20.0	40.0
		21	1	20.0	20.0	60.0
		26	1	20.0	20.0	80.0
		48	1	20.0	20.0	100.0
		Total	5	100.0	100.0	
yes	Valid	10	1	16.7	16.7	16.7
		14	1	16.7	16.7	33.3
		16	1	16.7	16.7	50.0
		19	1	16.7	16.7	66.7
		47	1	16.7	16.7	83.3
		49	1	16.7	16.7	100.0
		Total	6	100.0	100.0	

*Data conclusion on Table 24.

Table #23

Average Time

8th Grade Computer Apps Class			Frequency	Percent	Valid Percent	Cumulative Percent
no	Valid	7	1	20.0	20.0	20.0
		20	1	20.0	20.0	40.0
		21	1	20.0	20.0	60.0
		26.50	1	20.0	20.0	80.0
		47.50	1	20.0	20.0	100.0
		Total	5	100.0	100.0	
yes	Valid	10	1	16.7	16.7	16.7
		13	1	16.7	16.7	33.3
		16.50	1	16.7	16.7	50.0
		17	1	16.7	16.7	66.7
		41	1	16.7	16.7	83.3
		48.50	1	16.7	16.7	100.0
		Total	6	100.0	100.0	

*Data conclusion on Table 24.

Table 24 shows the mean score of homerow finger knowledge and the timing results broken down by participants that had attended 8th grade computer applications class versus the participants that had not attended the same class.

Table #24

Did Taking an 8th Grade Computer Apps Class Make a Difference?

8th Grade Computer Apps. Class			Total Number of Should Be Using Got Correct	Total Number of Actual Finger Use Same as Correct Finger	Timing #1 NWAM	Timing #2 NWAM	Ave. Time
no	N	Valid	5	5	5	5	5
	Mean		27.0000	26.4000	25.40	23.60	24.500
yes	N	Valid	6	6	6	6	6
		Missing	0	0	0	0	0
	Mean		27.0000	25.1667	22.83	25.83	24.333

The participants that had attended 8th grade computer applications class averaged 25.17 (out of 30) survey questions correctly for actual finger same as correct finger whereas participants that had not attended computer applications averaged 26.4 on the same survey questions. Attending 8th grade computer applications class does not appear to make a difference in correct homerow finger keystroking.

Both participants that had and had not attended 8th grade computer applications class averaged approximately 24.50 words per minute. Attendance in the class appears to have made no difference.

This summary concludes the presentation of the results of the study. Chapter V will present the summary, conclusion, and recommendations for Merrill High School Information Processing I teachers and administration.

Chapter V: Summary, Conclusions and Recommendations

This chapter will provide a summary of the research findings, conclusions, and recommendations. A recommendation for a further research study will be made.

Summary

The purpose of this study was to administer a survey and skills test (timings) to students enrolled in an Information Processing (keyboarding) class at Merrill High School to determine entering keyboarding competencies. The results of the study would identify if there was a need to re-teach the keyboard at the high school level, specifically at Merrill High School in the MAPS District. This research attempted to answer the following questions:

Research Questions and Results

1. What are the keyboarding knowledge competencies of students entering Information Processing I? It appeared that a number of the students knew which key they should use, but actually chose to use the incorrect key to strike the letter.
2. What are the keyboarding psychomotor competencies of students entering Information Processing I? Based on the findings of the timings, only a few of the students are meeting the suggested 30-35 WAM by Wisconsin DPI. On timing #1, the boys averaged 22 WAM where the girls averaged 27 WAM. The same results were for the second timing (timing #2).
3. What is the difference in knowledge and psychomotor competencies based on selected demographic factors (gender, age, previous courses, computer at

home)? Unfortunately, the researcher was unable to perform these analyses because of an insufficient number of study participants. There were insufficient participants for statistical testing by gender, age, previous courses or computers at home. When comparing the two genders with the total number "of should be using got correct," the males got 27 out of 30 correct as did the females. However, when analyzing the total number of "actual" finger use same as correct finger, the male averaged 24 out of the 30 (80%) using correct fingers whereas the females averaged 26 out of the 30 correct (87%).

4. What is the difference in knowledge and psychomotor competencies based on the elementary school (private or public) they attended? Again, the research was unable to perform analysis because of insufficient study participants.
5. What is the difference in knowledge and psychomotor competencies based on the middle school (private or public) they attended? See above.

Conclusions

Data was collected by administering a survey to a total of 14 Information Processing I students. The small size of the sample is very much a limitation to this study. It was very difficult to form any generalization based upon the results of the sampling alone. The data did suggest that students know which homerow finger they should be using, but are actually using incorrect homerow fingers to strike letters.

Recommendations.

It would appear that the need to re-teach the homerow keys at the high school level is still necessary to reinforce the correct stroking of the keys. Also, a recommendation will be made that an in-service day be held to help train the elementary teachers on

an in-service day could be recommended for all middle school teachers since keyboarding is being implemented in the core subjects.

Further research needs to be complete at Merrill High School in regards to answering the research questions. Because of the small sampling size, another survey should be completed by all Information Processing students to determine these answers. Since the results of the next survey would not be published, all students could participate and the survey could be administered as a pre-test. The survey should be a replica of previous research. Multiple applications could be simulated.

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Appendix A

This research has been approved by the UW-Stout IRB as required by the Code of Federal Regulations Title 45 Part 46.

BUSINESS & INFORMATION TECHNOLOGY DEPARTMENT
INFORMATION PROCESSING I SURVEY
Merrill High School, Merrill, Wisconsin

Contacts Attempted: _____ Date 1 _____ Time _____
Survey #_____ Date 2 _____ Time _____
Date _____ Date 3 _____ Time _____

PURPOSE
The purpose of the study is to determine if it is necessary to re-teach the keyboard in Information Processing I at Merrill High School. You are one out of ___14__ Merrill High School students selected to complete this approximately 30 minute survey during the fall of the 2008-2009 school year. Therefore, your responses are valuable.

DIRECTIONS:
Please answer the following questions listed on both the front and back of this survey to the best of your ability. Place an "X" on the line that best answers the question. You are asked **NOT** to put your name anywhere on this survey. Thank you.

1. Place "X" on the line that describes you.

_____ 9th Grade Girl	_____ 9th Grade Boy
_____10th Grade Girl	_____10th Grade Boy
_____11th Grade Girl	_____11th Grade Boy
_____12th Grade Girl	_____12th Grade Boy

2. Did you attend elementary school in Merrill? _____ yes _____no

3. If the answer to #2 was yes, which elementary school did you attend? _____

4. If the answer to #2 was no, where did you attend elementary school?
   Name of school_____ City_____ State_____

5. Did you attend Prairie River Middle School in Merrill? __ yes__no

6. If the answer to #5 is yes, have you taken 8th grade Computer Applications class? __ yes__no

7. If the answer to #5 is no, where did you attend middle school?
   Name of School_____ City _____State_____

8. Have you taken the high school course Computer Applications I? ____yes___no

9. Do you use a computer at home? _____ yes _____no

10. Why did you take, or plan to take, Information Processing I? (Please check all that apply)

a. _____Personal Interest	f. _____Course description guide
b. _____Guidance counselor	g _____Friend taking the course
c. _____Parents	h. _____Friends or relatives took a keyboarding class
d. _____Curiosity	i. _____Other_____
e. _____Teacher(s)	

Directions: In the spaces provided, list the homerow finger you should use to strike the indicated letter. In the next space, write the homerow finger you actually use. You may look at your computer keyboard to help find the answers. The first one is done for you.

Of the home row keys **A S D F J K L ;**	Should be using	Actual finger you use
11. Which homerow finger strikes the letter a?	A	A
12. Which homerow finger strikes the letter b?	_____	_____
13. Which homerow finger strikes the letter c?	_____	_____
14. Which homerow finger strikes the letter d?	_____	_____
15. Which homerow finger strikes the letter e?	_____	_____
16. Which homerow finger strikes the letter f?	_____	_____
17. Which homerow finger strikes the letter g?	_____	_____
18. Which homerow finger strikes the letter h?	_____	_____
19. Which homerow finger strikes the letter i?	_____	_____
20. Which homerow finger strikes the letter j?	_____	_____
21. Which homerow finger strikes the letter k?	_____	_____
22. Which homerow finger strikes the letter l?	_____	_____
23. Which homerow finger strikes the letter m?	_____	_____
24. Which homerow finger strikes the letter n?	_____	_____
25. Which homerow finger strikes the letter o?	_____	_____
26. Which homerow finger strikes the letter p?	_____	_____
27. Which homerow finger strikes the letter q?	_____	_____
28. Which homerow finger strikes the letter r?	_____	_____
29. Which homerow finger strikes the letter s?	_____	_____
30. Which homerow finger strikes the letter t?	_____	_____
31. Which homerow finger strikes the letter u?	_____	_____
32. Which homerow finger strikes the letter v?	_____	_____
33. Which homerow finger strikes the letter w?	_____	_____

34. Which homerow finger strikes the letter x? _____ _____

35. Which homerow finger strikes the letter y? _____ _____

36. Which homerow finger strikes the letter z? _____ _____

37. Which homerow finger strikes the enter key? _____ _____

38. Which homerow finger strikes the letter ; _____ _____

39. Which homerow finger strikes the letter capital F? _____ _____ _____ _____
(need to list two fingers for this one)

40. Which homerow key strikes the letter capital J? _____ _____ _____ _____
(need to list two fingers for this one)

Thank you! ☺

Appendix B

August 26, 2008

Dear Parent or Guardian:

Your child has the opportunity to take part in a study that will help determine where to begin the curriculum in the Information Processing I class at Merrill High School. By providing this information, the Merrill High School Information Processing teacher will be able to make modifications that reflect the feedback that is provided. This should allow the program to become even stronger, which will allow more students to obtain more training and preparation for a career utilizing keyboarding.

The research will involve surveying students and taking a timed typing test at Merrill High School; it will be a 40-question survey and a 3-minute timing. Most of these students will be minors; some of them may also be in the special education program. However, if students are in a special education program, this will not be identified in any manner. The students who are completing the survey will be students who are mainstreamed.

The commitment in participating in this research is limited to completing the survey and taking the timing. No other types of participation will be required, and there is no payment or compensation given for completing the survey. Participation is voluntary. Students may choose not to participate without any adverse consequences to them. Should students choose to participate and later wish to withdraw from the study, they may discontinue their participation at that time without incurring adverse consequences.

The survey and timing will be administered in the Information Processing class with Mrs. Pierschalla during normal class hours. No extra or out of classroom time will be required to participate in the study. I encourage every student in the class to participate so that the sample data is a true picture of the typical Information Processing class. If participants are all students who feel they are "good" keyboarders or vice versa, the data collected may not be representative of the typical class. Student names will not be included on any documents. The enclosed consent form will not be kept with any of the other documents completed with this project.

Please take advantage of this opportunity to provide input at Merrill High School by signing and returning the consent form in the enclosed envelope. For your convenience, you can send the signed form with your student to school and give to Mrs. Jameson in Room 103. Please return this form before Wednesday, September 3, 2008. If you have any questions or concerns, please do not hesitate to contact my research sponsor or me. (This information is provided on the consent form).

Sincerely,

Dawn Jameson, Instructor
Business & Information Technology

Enclosure

Appendix C

Consent to Participate In UW-Stout Approved Research

Title: An Evaluation to Determine the Need to Re-teach the Keyboard at the High School Level in Merrill, WI

Investigator:
Dawn Jameson
Merrill High School
715-536-4594 x3103

Research Sponsor:
Julie Furst-Bowe
303 Administration Building
715-232-2421

Description:
The purpose of this research is to determine if there is a need to re-teach the keyboard at the high school level in Merrill, Wisconsin.

Risks and Benefits:
The risk that may be involved includes providing feedback on the student's keyboarding competencies. Although the questions that are being asked are not high risk, the student may still feel uneasy in providing this information.

By providing this information, the Merrill High School Business & Information Technology Department will be able to make modifications that reflect the feedback that is provided. This should allow the program to grow, which will allow more students to obtain more training and preparation for careers utilizing keyboarding skills.

Special Populations:
The research will involve surveying students at Merrill High School. Most of these students will be minors; some of them may also be in the special education program. However, if students in a special education program, this will not be identified in any manner. The students who are completing the survey will be students who are mainstreamed.

Time Commitment and Payment:
The commitment in participating in this research is limited to completing the survey and taking a timed typing test. No other types of participation will be required, and there is no payment or compensation given for completing the survey. Participation is voluntary.

Confidentiality:
Student names will not be included on any documents, and we do not believe that students can be identified from any of this information. This informed consent will not be kept with any of the other documents completed with this project.

Right to Withdraw:
Student participation in this study is voluntary. Students may choose not to participate without any adverse consequences to them. Should students choose to participate and later wish to withdraw from the study, they may discontinue their participation at that time without incurring adverse consequences.

IRB Approval:
This study has been reviewed and approved by The University of Wisconsin-Stout's Institutional Review Board (IRB). The IRB has determined that this study meets the ethical obligations required by federal law and University policies. If you have questions or concerns regarding this study please contact the Investigator or Advisor. If you have any questions, concerns, or reports regarding your rights as a research subject, please contact the IRB Administrator.

Investigator:
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IRB Administrator
Sue Foxwell, Director, Research

152 Vocational Rehabilitation Bldg.
UW-Stout
Menomonie, WI 54751
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Statement of Consent:
By signing this consent form, you agree to participate in the project entitled, "An Evaluation to Determine the Need to Re-teach the Keyboard at the High School Level in Merrill, Wisconsin."

_____ _____
Student Signature Date

_____ _____
Parent or Guardian Signature Date
(If minors are involved)