

From Rhetoric to Practice:
Issues in Teaching and Learning
Touch Keyboarding

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I hereby certify that the work embodied in this thesis is the result of original research and has not been submitted for a higher degree to any other University or Institution.

(Signed):

Dedication

I would like to dedicate this thesis to my father, Edward John Burns. As an Electrical Engineer he constantly strives towards high standards, a sound work ethic and good humour. Thank you for your standards, insight, support and encouragement.

TABLE OF CONTENTS

CHAPTER ONE: INTRODUCTION	1
OVERVIEW	1
Focus	1
Chapter Overview	1
IMPACT OF PERSONAL COMPUTERS	2
PERSONAL BACKGROUND IN KEYBOARDING	4
Trade Experience	4
Retraining as a Trade Teacher.....	5
Technical sector	5
Primary sector	7
Secondary sector	8
Tertiary sector	8
Publications	10
VET work placement supervisor.....	10
ISSUES LEADING TO THIS RESEARCH.....	11
Is touch keyboarding an important skill?	11
Who can teach touch keyboarding?	13
Where should touch keyboarding be taught?	14
Testing to an Australian Standard.....	14
Why the resistance to learn touch keyboarding?.....	15
National Training Packages	16
Occupational Health and Safety Issues	17
RESPONSE TO CURRENT ISSUES	18
RESEARCH QUESTIONS.....	19

CHAPTER TWO: LITERATURE REVIEW	20
INTRODUCTION.....	20
RHETORIC	20
National context	20
National goals.....	20
Computers – a basic tool	21
Definitions.....	22
Keyboarding terms	22
Conversion of terminology from touch typing.....	23
Educators identified as a keyboard operator	23
Australian Standards and Regulations affecting computer keyboards.....	24
Australian Standards for keyboard layout.....	24
Occupational Overuse Syndrome.....	26
Duty Of Care	27
Identification of potential hazard	27
The keyboard: critical interface between man and machine.....	29
Literature search techniques.....	29
Ordinary writing tool.....	30
Teacher standards in ICT	31
Current texts in learning to teach touch keyboarding	32
Computer software packages for learning touch keyboarding.....	32
Keyboard layout - QWERTY vs. Dvorak Simplified Keyboard	33
Research and development into ergonomic keyboards.....	34
School students can learn to touch type/keyboard	35
PRACTICE IN TOUCH KEYBOARDING	36
Access to technology within the educational agenda.....	36
NSW Technology Budget for 2002-2003	36
NSW schools and colleges access to ISP services	37
Professional development for touch keyboarding.....	37

Touch keyboarding within the curricula	38
USA – home of touch keyboarding.....	38
National change to curricula	39
Intrastate	40
Matrix of documentation.....	41
Testing acquisition of skills	41
Australian Standard Keyboarding Speed Tests.....	41
NSW Police Force entry requirements.....	41
Commercial Education Society of Australia.....	42
Mandatory testing.....	42
Curricula and mandatory assessment	44
Keyboarding within a support for instructional change.....	45
Computer skills set.....	45
Keyboarding texts	45
TOUCH KEYBOARDING: BARRIERS TO ACQUISITION	46
Teaching touch keyboarding qualified educator	46
Instructional keyboarding texts	48
Learning how to touch keyboard - the human element.....	49
Negative transfer when changing methods of keyboarding.....	50
Time factor within the classroom.....	50
Ergonomic factors in early childhood	51
Reading required in acquiring touch keyboarding	52
Support mechanisms to assist students at risk.....	53
Skill development vs. core skills.....	53
The question of acquisition	55
SUMMARY OF LITERATURE REVIEW.....	56
Internationally	56
Australia	57
New South Wales, Australia	57

CHAPTER THREE: METHODOLOGY.....	59
RESEARCH DESIGN.....	59
STRUCTURED INTERVIEW	59
Question planning for interview.....	60
Stratified sampling	63
Sample size.....	63
Sample group and sub groups	63
Primary School – feeder school to high school.....	64
High School – feeder school to University	65
School of Education – trainer of preservice teachers.....	65
Research documentation	65
TESTING OF TOUCH KEYBOARDING SKILLS	66
Test group	66
Testing.....	66
Correctness of posture.....	66
Assessing the workstation through the checklist	67
Frequency diagram.....	67
University Access Program – feeder program to University	68
DATA COMPILATION	69
CONCLUSION.....	69
CHAPTER FOUR: RESULTS	70
INTRODUCTION.....	70
DEMOGRAPHICS OF RESPONDENTS.....	70
STRUCTURED INTERVIEW	71
Use of computer keyboard for course related activities.....	71
Time students spend on a computer keyboard	72
Expectations of computer keyboard work by students	73
Student proficiency at touch keyboarding.....	75
Institution support for learning handwriting	76
Institution support for learning computer keyboarding skills.....	77
When to introduce computer keyboarding	79
Teacher proficiency in touch keyboarding.....	82
How teachers learn to teach keyboarding	84

Average computer keyboard time for teachers	85
Institutional support for teachers learning computer keyboarding	86
Institutional resources for teaching computer keyboarding	87
Type of computer keyboard work by teachers	88
Additional tasks required of teachers	89
Computer keyboarding style of teachers.....	90
Teachers time spent using computer keyboarding style	92
Occupational Health & Safety concerns with "hunt and peck"	93
Advantages/disadvantages “hunt and peck” style.....	94
Occupational Health & Safety concerns with touch keyboarding	95
Advantages/disadvantages using touch keyboarding style	96
Difficulties in learning to touch keyboard	97
Difficulties in teaching touch keyboarding.....	97
Available institutional resources	99
Interest in changing computer keyboarding style	100
Negative learning impact in changing styles	102
Responsibility to deliver touch keyboarding programs	103
General comments from teachers.....	104
TESTING OF TOUCH KEYBOARDING SKILLS	105
Keyboarding entry skills	105
Delivery of the introduction to computing course	105
Introduction to computing bridging course - testing touch keyboarding.....	105
Observation sheet.....	109
Frequency diagram.....	109
Workstation checklist.....	110
SUMMARY OF RESEARCH FINDINGS	111
Current practice in learning keyboarding.....	111
Current practice in teaching keyboarding	111
Touch keyboarding or hunt and peck.....	112
Issues in teaching and learning touch keyboarding.....	112
Teaching touch keyboarding to tertiary students	113

CHAPTER FIVE: ANALYSIS	114
ANALYSIS - EMERGING TRENDS.....	114
Teaching and learning touch keyboarding	115
Touch keyboarding within the Curricula	116
Increasing expectations of computer keyboarding.....	116
DEFINITION OF A WRITING TOOL	117
VALUE OF TOUCH KEYBOARDING	117
OCCUPATIONAL HEALTH AND SAFETY.....	118
LIMITATIONS OF METHODOLOGY	118
CHAPTER SIX: CONCLUSION	121
REDEFINITION AS A WRITING TOOL	121
DUTY OF CARE.....	123
EFFICIENT USE OF A COMPUTER KEYBOARD.....	123
RECOMMENDATIONS:	124
Computer keyboarding as a writing tool.....	124
Duty of Care	124
Further investigation	125

Tables

Table 1	New South Wales Policy Statements for Computing Skills in Schools	21
Table 2	Ergonomically Styled Computer Keyboards	35
Table 3	NSW School Education Budget Overview	36
Table 4	Computer Skills Assessment Year 6 ICT Skills	43
Table 5	Year 10 – Trial Year 10 Computing Skills Assessment 2003	43
Table 6	Respondents Current Teaching Responsibilities	70
Table 7	Expectations of students with regard to course related activities	71
Table 8	Time Spent by students on a Computer Keyboard	72
Table 9	Average Time Spent on Computer Keyboard by Sector.....	73
Table 10	Expectations of Computer Keyboard by Students	74
Table 11	Keyboard Proficiency of Students	75
Table 12	Keyboard Proficiency of Students by Sector	76
Table 13	Institutional student support for learning handwriting.....	77
Table 14	Institutional student support for learning handwriting by sector	77
Table 15	Institution student support for learning keyboarding.....	78
Table 16	Respondents View on Learning Keyboarding by sector.....	79
Table 17	When to introduce computer keyboarding.....	79
Table 18	When to introduce students to keyboarding.....	80
Table 19	When to introduce students to keyboarding by Stages	81
Table 20	Teacher proficiency in <i>touch keyboarding</i>	82
Table 21	Keyboard Proficiency of Respondents by Sector	83
Table 22	How teacher learn <i>touch keyboarding</i>	84
Table 23	Amount of time respondents spend on a keyboard each week	85
Table 24	Average Time Respondents spend on computer keyboard by sector	85
Table 25	Institutional support available for teaching keyboarding.....	86
Table 26	Institutional resources available to assist in teaching keyboarding	87
Table 27	Keyboard Tasks Performed by Respondents	88
Table 28	Keyboard Task Expectations of Respondents by Usage.....	89
Table 29	Style of Keyboarding Method of Respondents	90
Table 30	Style of Keyboard of Respondents by Sector	91
Table 31	Number of years respondents have been keyboarding.....	92
Table 32	Respondents Average Years Using Keyboarding Method by sector.....	92
Table 33	OH&S concerns with regard to “hunt and peck” keyboarding.....	93
Table 34	Advantages and disadvantages of “hunt and peck” style.....	94
Table 35	OH&S concerns with regard to <i>touch keyboarding</i>	95
Table 36	Advantages and Disadvantages of <i>Touch Keyboarding</i>	96
Table 37	Difficulties in learning <i>touch keyboarding</i>	97
Table 38	Difficulties in teaching <i>touch keyboarding</i>	98
Table 39	Resources available and their adequacy for teaching	99
Table 40	Respondents views on changing method of keyboarding and reasons	100
Table 41	Negative learning impact on changing methods of keyboarding.....	102
Table 42	Responsibility for teaching <i>touch keyboarding</i>	103
Table 43	Further comments on interview	104
Table 44	2003 Introduction to Computing Bridging Course	106
Table 45	2004 Introduction to Computing Bridging Course	107

Figures

Figure 1	1878 Typewriter Patent Drawing.....	24
Figure 2	2003 Windows Software Activated Keyboard	24
Figure 3	Sample arrangement and location of keys	25
Figure 4	Dvorak Simplified Keyboard (2004)	33
Figure 5	Qualifications According to Educational Sectors in New South Wales.....	39
Figure 6	NSW Department of Education Powerpoint Presentation (2004)	44
Figure 7	Qwerty Keyboard from Pitmans College (1962).....	46
Figure 8	Stages in Planning Structured Interview adapted from Manion (1994, 84) .	61
Figure 9	Sociogram identifying relationships between institutions	64
Figure 10	Posture diagram	67
Figure 11	Computer Workstation Checklist	67
Figure 12	Frequency Diagram	68

Appendices

Appendix A: Officewise Hazard Checklist

Appendix B: Jefferson County Public School – Keyboard Expectations

Appendix C: National Office Skills Modules

Appendix D: Matrix Of Documentation

Appendix E: Sample Of Keyboarding Plus Text

Appendix F: Analysis Of Student Keyboarding Texts

Appendix G: Analysis Of Teacher Keyboarding Texts

Appendix H: Structured Interview Questions Schedule

Appendix I: Research Documentation

Appendix J: UoN Bridging Course

Appendix K: Touch Keyboarding Attendance Sheet

Appendix L: Observation Sheet And Frequency Diagram

Appendix M: Computer Workstation Checklist

Appendix N: Interview Question Reports

Appendix O: Keyboarding Test Papers

Abbreviations used within the thesis

ANTA	Australian National Training Authority
CESA	Commercial Education Society of Australia
DET	Department of Education and Training
DETYA	Department of Training and Youth Affairs
Email	Electronic Communication
HIT	Hunter Institute of Technology
HSC	Higher School Certificate
ICFIP	Industry Curriculum Framework Information Package
ICT	Information and Communication Technology
KLAs	Key Learning Areas
NCAE	Newcastle College of Advanced Education (now amalgamated with the University of Newcastle)
NSW	New South Wales
OH&S	Occupational Health and Safety
OOS	Occupational Overuse Syndrome
RPL	Recognition of Prior Learning
RSI	Repetitive Strain Injury
TAFE	Technical and Further Education
UoN	University of Newcastle
VET	Vocational Education and Training

Touch keyboarding as a vocational skill is disappearing at a time when students and educators across all educational sectors are expected to use a computer keyboard on a regular basis. There is documentation surrounding the embedding of Information and Communication Technology (ICT) within the curricula and yet within the National Training Packages *touch keyboarding*, previously considered a core component, is now an elective in the Business Services framework. This situation is at odds with current practice overseas where *touch keyboarding* is a component of primary and secondary curricula. *From Rhetoric to Practice* explores the current issues and practice in teaching and learning *touch keyboarding* in primary, secondary and tertiary institutions. Through structured interview participants detailed current practice of teachers and their students. Further, tertiary students participated in a training program aimed at acquiring *touch keyboarding* as a skill to enhance their studies. The researcher's background experience of fifteen years teaching *touch keyboarding* and computer literacy to adults and 30 years in Business Services trade provides a strong basis for this project. The teaching experience is enhanced by industry experience in administration, course coordination in technical, community and tertiary institutions and a strong commitment to the efficient usage of a computer by all. The findings of this project identified coursework expectations requiring all students from kindergarten to tertiary to use a computer keyboard on a weekly basis and that neither teaching nor learning *touch keyboarding* appears in the primary, secondary and tertiary curricula in New South Wales. Further, teachers recognised *touch keyboarding* as the preferred style over 'hunt and peck' keyboarding while acknowledging the teaching and learning difficulties of time constraints, the need for qualified *touch keyboarding* teachers and issues arising when retraining students from existing poor habits. In conclusion, this project recommends that computer keyboarding be defined as a writing tool for education, vocation and life, with early instruction set in the primary schooling area and embedding *touch keyboarding* within the secondary, technical and tertiary areas and finally to draw the attention of educational authorities to the Duty Of Care aspects associated with computer keyboarding in the classroom.

CHAPTER ONE: INTRODUCTION

Overview

Focus

This thesis represents an exploration of the issues in teaching and learning *touch keyboarding* in New South Wales (NSW), Australia. The exploration moves from the rhetoric within the literature surrounding *touch keyboarding*, to the practice of how to teach and learn *touch keyboarding*, through to the issues highlighted by the literature and practice. This exploration is underpinned by the theoretical, practical and professional experience of the researcher.

Prior to 1995, teaching and learning *touch keyboarding* formed a core component of a trade Business Services course delivered by qualified trade teachers from technical institutions and business colleges. As standard practice over many decades, *touch keyboarding* was taught alongside other requisite core components such as file management, office procedure and Occupational Health and Safety (OH&S) matters, sufficient to manage a small office.

Computers and the integration of Information and Communication Technology (ICT) within educational curricula require students and educators to interact with a computer using a computer keyboard on a regular basis. This development moves the need to perform the skill of keyboarding throughout the curricula, from trade to primary, secondary and tertiary levels.

This thesis will also include an exploration of the ergonomic factors in computer use, the impact of computers and the associated Occupational Health and Safety concerns arising within educational settings.

Chapter Overview

Chapter One will outline the impact of personal computers on society and educational institutions, present the trade, industry and education background of the research and draw attention to the issues leading to this research.

Chapter Two explores the literature from three perspectives: the rhetoric – what is in the educational and legislative documents, the practice – where can *touch keyboarding* be found within curricula documentation and lastly, the issues – what are the issues raised by the literature review.

Chapter Three provides detail of the research questions, the development of research instruments and the methodology applied within this thesis.

Chapter Four details the results from the research project under two sections: the structured interview – what the educators say and the test group – results from teaching *touch keyboarding*.

Chapter Five analyses the information from the literature review together with the results from the data collection.

Chapter Six will encapsulate the research project and provide recommendations and direction for the stakeholders: the Department of Education and Training, the University of Newcastle and for the researcher and defines recommendations for ongoing research.

Impact Of Personal Computers

An early invention called the Teletype machine in the 1920s is of historical significance for the QWERTY keyboard (Bellis, 2004). During the same year another invention called the teleprinter had “*a keyboard for input*” (The History of Computing Foundation, 2004). Both machines used keyboards with a QWERTY layout. This early combination continued with the development of the personal computer.

The advent of the personal computer initiated a significant change in the population of those operating the QWERTY keyboard and the general expansion of this role within society for business and private use. When personal computers moved onto the desks of executives, managers, teachers and students, the entering of data via a computer keyboard was no longer the sole responsibility of secretaries and clerks trained for this work by inclination and experience.

This is further substantiated when the Standards Association of Australia (2001) updated its terminology to reflect the change of equipment from “Typing” to “Keyboarding”. Therefore the terminology within this thesis reflects “typing” when referring to entering data on a typewriter and “keyboarding” when referring to entering data on a computer keyboard. Both methods and equipment refer to the use of the QWERTY keyboard layout.

Further change came in 1968 with the development of the mouse in its various forms as a pointing device (Bellis, 2004). This provided computer users with an alternative way of navigating through software programs to select features and thereby provide computer users with the choice of using the mouse or the computer keyboard to perform specific tasks (for example selecting from toolbars and menus as an alternative to keyboard shortcuts or function keys).

At the same time in 1968, the next most significant development has been Electronic Communication (Email) (Bellis, 2004). This allows information and files to be sent electronically to another party or parties with minimal effort. The computer keyboard is the common input device used in connection with Email and with many businesses and educational institutions adopting Email as the preferred method of communication, computer keyboard usage has seen a rapid increase.

A national strategic priority is “*the integration of ICT skills in all courses in all parts of the education and training sector*” (DETYA, 2000, 11). With personal computers now a component of educational life in Australia, educators and students, from early primary to tertiary, are required to use a computer as a normal part of the curricula delivery for teaching and learning. This places keyboarding as an important skill for everyone to learn and an essential skill where efficiency is desired.

A working party for the Victorian Government (1994) emphasise the importance of keyboard skills. The report recognises that while voice recognition and voice-activated computers are in the developmental stage, keyboard skill will continue to be of importance. In 2004, the importance of keyboard skills remains high.

Personal Background in Keyboarding

Trade Experience

As a teenager I attended a Melbourne Business College to acquire the necessary skills for employment as a secretary. A core component of the business course was the formal acquisition of *touch typing* skills on the standard device of the 1970's – a manual typewriter. After 12 months of training I entered the workforce with a typing speed of 35 wpm.

Over the next twelve years of employment as a private stenographer/secretary, the standard equipment developed from manual to electric typewriters progressing to electronic and then to word processing programs in the late 1980's. As the typewriter and computer keyboard used the standard QWERTY layout (Bellis, 2004), the changeover only required an adjustment in the manner in which each key was pressed, with the location of common individual keys remaining unchanged, plus the addition of computer specific keys in strategic positions.

Touch typing skills were essential criteria for employment as a professional secretary in the 1970's and 1980's. Thus applicants were required to demonstrate their typing skills by undertaking a typing test that would be administered by the employer at interview, or by an employment agency as a third party.

For example at the Newcastle College of Advanced Education (NCAE), all secretaries were encouraged to achieve typing speeds of 50 wpm or 60 wpm as tested under Australian Standard AS2708 with the 5 minute time requirement of the standard test being increased to 10 minutes. Annual incremental salary increases were available when a secretary successfully passed each speed level twice.

In the 1980's all secretaries at NCAE moved to word processing and were required to adapt and update their skills and learn how to operate computers and the word processing software then in vogue.

The *touch typing* skill I acquired on a manual typewriter in the 1970's is the same skill that I apply to enter data via a computer keyboard in the 2000's adapted to suit the wider range of keys and the different key pressures.

Retraining as a Trade Teacher

In 1987, in order to begin a new career teaching my secretarial trade, I completed a Typing Instructors Course with the Department of Technical and Further Education (TAFE). This certificate was comprised of 50% theory of teaching and further practice in *touch keyboarding* and 50% devoted to practical application using the features of the typewriter in the production of appropriate business standard documentation and the imparting of information to students. Achieving a typing speed of 50 wpm under Australian Standard AS2708 (Standards Association of Australia, 2001) test conditions was part of the examination criteria that needed to be fulfilled.

As this qualification was only recognised intrastate (New South Wales, Australia) I was encouraged to sit for the Teaching Certificate in Typewriting offered by the Commercial Education Society of Australia (CESA). The CESA qualifications are recognised nationally in Australia and comprised four sections, practical speed and documents, theory, classroom management and lesson plan.

In 1988, my TAFE and CESA teacher training was based on teaching typewriting, however, the resources and rooms available for classes were a combination of typewriters and computer laboratories using keyboards. To meet the demands and expertise required for teaching, I then completed a Teaching Certificate in Word Processing from CESA. This involved assessment of practical skills, theory of teaching, classroom management and lesson preparation and student assessment by way of appropriate examinations.

Technical sector

My early teaching experience began with Labour Market Programs in TAFE in 1988. The programs were designed for the skilling of disadvantaged groups including the long term unemployed, women returning to the workforce, those of non English speaking background, unemployed youth and other groups identified as being at risk of long term

unemployment. The main aim of these programs was to provide participants with skills to move into the workforce or to move on to further education.

My role as a keyboarding teacher began with typewriters and quickly moved to teaching *touch keyboarding* and word processing on personal computers. At this time there were many participants, both male and female, who arrived at the course with little or no experience in using a typewriter or a computer keyboard.

My teaching experience continued with disadvantaged groups when I began teaching computing and *touch keyboarding* at a Metropolitan SkillShare. The teacher qualifications and student groups were very similar to my earlier experience at TAFE.

Participants within these programs arrived with little or no knowledge or experience of keyboards with teaching staff required to meet the employment conditions of a TAFE Keyboarding Teacher and to have at least two years teaching experience.

Within this environment, I discovered that students with lesser English reading skills, found it more difficult to learn *touch keyboarding* compared to students whose English reading skills were close to, or the same as, a native reader. Students in this position are faced with typing drills and then word combinations, which to them are as meaningless as entering a string of numbers. This limits the amount of information taken into memory and thereby inhibits the flow, accuracy and speed of entry. Persons who cannot read fluently pose particular difficulties for the teacher as reading is required to interpret the texts for entering data.

In 1995, at the Hunter Institute of Technology (HIT) within the Faculty of Business Administration, my experience involved teaching for the *Certificate II in Business Administration* together with other courses in Labour Market Programs and Work Cover as well as individual *touch keyboarding* subjects for other faculties.

Participants within the Certificate II course were entering from high school and others were of mature age wanting to retrain or return to the workforce. From 1995 students entered courses with some keyboarding skills. However, no students from high school arrived with *touch keyboarding* skills as such, although some retraining participants did

arrive with *touch keyboarding* skills gained from industry experience or from previous trade courses they had undertaken.

Also at HIT, another discrete group were Higher School Certificate (HSC) students who were enrolled in fundamental and *touch keyboarding* modules at TAFE. These students were among the many who arrived with poor keyboarding habits. The keyboarding skills, so called, were mostly self taught through using a computer keyboard at school or at home. Remedial teaching of these students proved most difficult given their class was scheduled one day per week and students were continuing to use their old habits in between attending *touch keyboarding* classes. Given this difficulty, the success rate with students within this group was not great.

In summary, from 1995 forward, students enrolling at HIT and participating in my classes predominantly arrived with the poor keyboarding habits described, which required retraining and discarding of previous poor habits to obtain an adequate level of performance.

Primary sector

In 1997, a local primary school installed a networked computer laboratory and embarking on a program to encourage school wide usage of this laboratory. The introduction of a computing laboratory into the K to 6 classroom timetable raised issues and concerns by teachers about their ability and expertise in moving into such a technological environment for the first time.

I was invited to support the installation of the computer laboratory through the introduction of a *touch keyboarding* program. This became part of an action research study within a Literacy Key Group Program (NSW DET and TJPS, 1996). I remained in the computer laboratory for four weeks, full-time, as the technology teacher, with classes timetabled twice a week. Teachers were provided with four weeks of technical support and team teaching. As the initial teacher, with trade and teaching certificates and industry experience, I supported the primary qualified teaching staff, who were encouraged to utilise the program.

Students from Years 4, 5 and 6 participated with classroom teachers accompanying each group. The results were highly successful. The students were very keen to acquire new skills, eager to participate within the *touch keyboarding program* and equally interested in all aspects of the computer laboratory.

Occupational Health and Safety requirements and appropriate ergonomic practice such as adjusting the workstation to suit the student, adjusting the chair, taking care to avoid glare on the computer screen, monitoring breaks from the computer, regularly questioning students about any difficulties with their necks, backs, arms wrists, formed an integral component of this program. Several students were withheld from the program due to sprains and broken arms and one student was referred to a specialist when keyboard practice resulted in the aggravation of a previous injury.

Secondary sector

In 2003, I applied to the NSW Department of Education and Training (DET) to have my trade qualifications and adult teaching qualifications and experience recognised. I was successful in gaining a New South Wales teaching number with permission to teach Computing Studies to Years 7 to 10. This demonstrates the ability for Business Services teachers from the technical sector being recognised for teaching in the secondary sector.

Tertiary sector

In 1998, I began teaching Open Foundation students at the University of Newcastle (UoN). Two bridging programs were designed, one focusing on basic introduction to computers and a second focusing on the computing skills required by the Open Foundation student to successfully enrol in their particular subjects.

Students entering the Open Foundation program are 19 years and over, who are interested in acquiring a tertiary qualification, or mature students returning to study after a break. Some students arrive with *touch keyboarding* skills from previous industry and educational experience, however, there were a significant number who arrived with little knowledge of the QWERTY layout and with poor habits using the “*hunt and peck*” method of keyboarding.

In my experience it seems that in every class group there are always a few who arrive with no keyboarding experience. This group is disadvantaged in comparison to their peers with respect to overall confidence, the ability to access essential information, loss of class time in using and navigating the computer software and the restrictions in their ability to complete computerised assignments and competency tests.

Within the “basic introduction to computers” bridging program for University entrants at UoN, a main component is learning how to *touch keyboard*. This has been an essential component of the basic skills that students require to function effectively as a tertiary student in today’s environment as identified by myself and supported through the Enabling, Languages and Open Foundation Centre.

OH&S issues are treated as a major component of the *touch keyboarding* programs. Although OH&S forms a companion to teaching *touch keyboarding*, this continues to be necessary because there seems to be a growing number of students entering the Open Foundation course who are afflicted with hand, wrist or back injuries. These have included back injury, missing digits, poor motor skills, damaged tendons, or neck stiffness.

During the last six years, enrolled students have presented with a variety of pre-existing health conditions. For example, one student, in Summer 2003, arrived with severe Occupational Overuse Syndrome (OOS) as a result of poor style in guitar playing. The OOS had resulted in the student being unable to complete the HSC, taking several years leave from study and then returning to study as a mature age student through Open Foundation. As the repetitive nature of keyboarding can aggravate existing injuries of this type, this student was immediately referred to the student support unit within the UoN to investigate the support and resources available.

Given the diversity within the Open Foundation groups, the *touch keyboarding* results vary widely. Some students are successful in the acquisition of *touch keyboarding* and others consolidate their existing skill and enhance speed and accuracy. There are a few students in each group, who find the retraining from “*hunt and peck*” to *touch keyboarding*, difficult or continue to feel it is unnecessary. The short nature of the course (two weeks) is, in one part, responsible for this group of students being

unsuccessful in their transition but their participation may well lead to improved performance and a spur to make further effort later in life.

Within UoN all courses require students to enrol online and communicate through Email and the Internet. The library offers its services online and many course resources are only available online. Yet there are no instructions directing students to acquire particular skills prior to enrolment. The course documentation does not indicate an assumed knowledge of the computer or any software programs nor direct students to acquire specific skills. If the UoN were more specific about the assumed knowledge regarding computer skills, students may be encouraged to use the bridging programs available.

Publications

As a result of my interest in teaching *touch keyboarding*, the *Keyboarding Plus Handbook* (Alderman, 2002) was designed to provide an easy to follow text for anyone from Year 3 primary up to adults. To assist in quickly acquiring keyboarding skills nonsense letters and number drills are avoided and by the second exercise a student is keying in words. This text is successfully used from primary to tertiary and is available in Australia and New Zealand. This text formed the basis of the *touch keyboarding Program* offered to the primary school described within the Primary Sector above.

At the request of my publisher, Horwitz Martin Education I became involved in a collaboration with another author, on a series of texts. *Computer Zone Activities* (Woods and Alderman, 2002) are designed to meet a range of computer-based Key Learning Areas (KLAs) within the NSW Primary Syllabus. The series ranges from Kindergarten to Year 6 with projects offering integrated opportunities to integrate ICT within the curricula. Keyboarding activities are a component throughout the series.

The activities provide a resource for teachers, students and parents that the publisher perceived was previously unfulfilled by existing texts or software.

VET work placement supervisor

In 2003, in a supervisory role, I accepted ten HSC students enrolled in a *Certificate II in Business Services* and provided a one-week work placement for each one. My role, in

providing work placement, involved establishing a business environment to allow the students to demonstrate and develop skills in Business Services.

Of the ten work placement students, only one demonstrated *touch keyboarding* skills under an Australian Standard Test. This student was self taught and displayed sound *touch keyboarding* skills and the remaining nine used the “*hunt and peck*” method of keyboarding. All students were enrolled in a VET course, delivered in different secondary schools and *touch keyboarding* did not feature as a module offered by any school.

A further role was to coordinate and supervise a simulated work placement for Year 11 students enrolled in the Certificate II in Information Technology. These students participated in a one week simulation involving continuous interaction with a personal computer via a keyboard. Of the 200 students supervised, I observed only one or two students demonstrating *touch keyboarding*. The following section explores why a lack of emphasis on teaching and acquiring *touch keyboarding* skills may be an area of concern.

Issues Leading To This Research

Is touch keyboarding an important skill?

In the 1900’s *touch keyboarding* was first invented to increase the speed and accuracy of a small number of female employees in the workforce. Given the number of Australians, the range of applications, the number of students, educators and employees using a computer keyboard today, *touch keyboarding* is of infinitely greater importance today. For example, at the NCAE in the early 1980’s, typewriters were on the desks of secretaries and clerks. At the UoN in the 2000’s, personal computers are on the desk of general and academic staff, with computer access available to all students. Email is the preferred form of communication within the University and access to student services, such as course enrolment, results and timetables, is online.

Traditionally, information for data entry was transcribed from handwritten text, shorthand notes or from a voice recorded dictation. With the increasing access to computers and the introduction of email, an expectation of composition at the keyboard

is more predominant now than the earlier type of transcription. This dichotomy represents both continuity in the use of the same computer keyboard and a change in the source of data for keyboard entry.

Students in technical and tertiary institutions are equally exposed to computers with the expectations of word processed assignments being standard and with Email, as the preferred method of communication, on the increase.

Through my contact with tertiary students, I am aware that HSC students are arriving at university in the 21st Century, having completed 13 years of schooling with access to computers being part of their school curricula and infrastructure in primary and secondary. This exposure to computers requires all computer operators to enter data via a computer keyboard. This data entry is called *keyboarding*. There are two methods of keyboarding *touch keyboarding* and “*hunt and peck*”.

Touch keyboarding is an efficient way to enter data into a computer via a keyboard. It allows the computer operator to spread the workload over nine fingers, develops speed and accuracy in entering data and eliminates the dependence of looking at the keyboard while pressing the keys. In particular, it enables the operator to concentrate on content rather than process.

“*Hunt and peck*”, as it is known colloquially, is a self-taught way of entering data into a computer via a keyboard. It requires the operator to look at the keyboard, locate a particular key, then press it. Individual operators develop quite different styles with single/two hand, two digit, six digit use or many other combinations. The only advantage with this style is there is no formal training needed. An operator simply begins using a computer keyboard and develops their style as they go.

Touch keyboarding is an important skill for students and educators in the 2000's. “*Within the last 25 years there has been a rise in the office economy sector*” (Doyle, Kurth and Kerr, 2000, 53) where workers are working in finance, administration, supervision, law, advertising, sales management, marketing and business services. These workers are called “knowledge workers”. Given this rising sector and increased

work within an office environment there would appear to be an ongoing, or ever-increasing need for retaining these vocation skills.

Who can teach touch keyboarding?

Any qualified teacher able to demonstrate *touch keyboarding*, experienced in the application of the skill and cognizant of the barriers in learning *touch keyboarding*, would be able to teach *touch keyboarding*.

Furthermore, a *touch keyboarding* teacher will need adequate classroom management skills in facilitation to accommodate the different learning pace of students, time management to coordinate access to computers where 1:1 student/computer access is unavailable and remedial strategies to assist students with any difficulties they may encounter.

In technical institutions qualified trade teachers who have skill and years of industry experience teach *touch keyboarding*. In the 1980's technical teachers were required to hold the following qualifications and experience for employment as a typewriting teacher:

- ❑ Teaching Certificate in Typewriting (including a typing speed of 50wpm)
- ❑ Trade Certificate one level higher than the Certificate being taught
- ❑ Basic Method of Instruction course
- ❑ 5 years industry experience within the trade

In the 2000's the requirements are somewhat changed to reflect the changes in technology. The requirements for a Word Processing and Keyboard teacher (NSW DET, 2003) are:

- ❑ Teaching Certificate in Word Processing and Keyboard (no keyboarding speed requirement)
- ❑ Trade Certificate one level higher than the Certificate being taught
- ❑ Certificate IV in Assessor and Training
- ❑ 3 years current industry experience

The reduction of time in industry experience is counterbalanced by the inclusion of the word “current”. This ensures the teachers are involved within industry to maintain their currency.

Anyone attempting to teach *touch keyboarding* will need to be able to demonstrate the skill to their students. It would be difficult, if not impossible, to support the skill acquisition, place value in the skill and diagnose difficulties, with no personal experience to draw from.

Where should touch keyboarding be taught?

In any educational curricula, where students and teachers are required to enter data into a computer keyboard, *touch keyboarding* is an important component in the integration of ICT and efficient operation of a computer.

Keyboarding is required in primary school, therefore, it is important to introduce a formal program within the primary years. The acquisition of *touch keyboarding* is a skill that will need to be used with an ongoing emphasis on maintaining the skill, therefore, it is equally important for ongoing skill development within the secondary and tertiary years.

To encourage and maintain *touch keyboarding* the curricula in primary, secondary and tertiary will need to incorporate *touch keyboarding* as a core component in ICT and make specific reference to it in each stage. A standard practice in the Business Services training packages in 1990s (National Office Modules, 1996) was to specify a minimum standard of keyboard speed and accuracy at each stage in the curricula to guide the progress of students.

Testing to an Australian Standard

There is an Australian Standard AS2708 (Standards Association of Australia, 2001) to assess the speed and accuracy of a person’s skill in *touch keyboarding*. This standard was the testing mechanism within the trade certificate for Business Services for decades. It provides a reliable and valid method of assessment under fixed conditions. Where *touch keyboarding* is specified within a curricula, the Australian Standard is the recommended testing mechanism to assess the word per minute rating of a keyboard operator.

Why the resistance to learn touch keyboarding?

In the researcher's experience there is a resistance to learn *touch keyboarding* that stems from several areas. Firstly, anyone can use a computer keyboard with very little instruction. Secondly, learning to touch keyboard is time consuming, requires practice and appropriate levels of support. And thirdly, there is little external incentive to learn from employers, educational curricula and educators.

Learning to *touch keyboard* is a repetitive process at best and boringly monotonous at worst. On a QWERTY keyboard there are 26 letters of the alphabet, 10 numbers plus punctuation and symbols to learn. Add in the shift keys, caps lock, backspace, enter and space bar and there are over 150 keystroke combinations that can be used to key in data into a computer.

When computers and word processing were developed, function keys, shortcut keys, the number keypad and directional keys were added to the standard QWERTY layout. These additional keys add a further layer of complexity and often cause confusion by activating software features in error.

If a person is learning to *touch keyboard* a number of factors may affect their progress. One factor is attitude – do they understand the purpose and value of learning *touch keyboarding*. A second factor is negative transfer – humans find it difficult to change habits even when the benefits are appealing and valid. A third factor is time – do they have the time to acquire the keyboarding skill and additional time to consolidate it. The final factor is resources – is there access to texts, software and qualified teaching staff to support the acquisition of this keyboarding skill.

There is an alternative style of keyboarding called “*hunt and peck*”. As discussed above the one advantage for this method is, initially, there is no training and an operator can quickly get started using the computer software packages. The disadvantage is the ongoing sight dependence on the keyboard that in turn restricts speed development and increases head movement.

There are several prerequisites that need to be in place before learning to *touch keyboard*. The first prerequisite is a certain maturity of growth. The computer keyboard is designed to suit the hand size of adults and for that reason learning to *touch keyboard* does present physical difficulties for the young. The second prerequisite is being able to read. Where the teaching resource is text based, a student will need to be able to read the text in order to key in the data.

At UoN employment in the 1980's necessitated the researcher being able to demonstrate *touch keyboarding* at interview. In 2004, this is not a current requirement even though the researcher's current position identifies several hours per day of computer keyboarding as part of the employment role.

Through involvement with teaching bridging courses to undergraduate tertiary students, the researcher is aware that students can self-identify their need and participate in the course. There is no formal documentation recommending or suggesting acquiring the skill nor are students denied access to computers due to their computer keyboarding style.

National Training Packages

In 1995, the Australian National Training Authority introduced Recognition of Prior Learning (RPL) as part of the National Training Packages (ANTA, 2002). RPL allows for articulation of courses between educational institutions and RTO's and recognises educational, life and employment experiences.

At UoN, tertiary students arriving with a *Certificate II in Information Technology* were given RPL within a computer course, where content is relevant. This caused concern when there appeared to be disparity between the skill level of students from VET in Schools and from HIT. The Certificated skills were not accepted for RPL and all students entering the course were required to demonstrate their skills in test conditions regardless of their qualifications (Tertiary Preparation Course, 2001). Although this may be an isolated situation, there is a concern that differences in who delivers a national package may bring about inconsistencies in RPL – a basic component of the national training packages.

As a Certificate II in Information Technology or Business Services are national qualifications, it is alarming when the standard of results achieved by students from different providers are dissimilar and an enrolling institution discriminates between delivering institutions. It calls into question the ability of the delivering institutions and ANTA to manage and deliver a national standard recognised by all educational institutions.

Occupational Health and Safety Issues

There are well-documented health risks associated with the repetitive nature of *keyboarding*. This is called Occupational Overuse Syndrome (OOS) as detailed in *Officewise* by Australian Government (2004) through Comcare and industry is well aware of the problems caused by incorrect and continuous use of a computer keyboard. The Standards Association of Australia in its *1994 Handbook Ergonomics – The Human Factor* encourages industry to be aware of these problems. (See Appendix D which also identifies documentation referring to health risks.)

As a result of this recognised health risk, there is now ergonomically designed furniture, regular breaks, office exercises, multi-tasking, changes in working hours and designated responsibilities for supervisors, managers and employers. These changes in responsibilities are reflected in the new Occupational Health and Safety Act 2000 (NSW Consolidated Acts, 2000).

As stated earlier, *Keyboarding* is a common practice today. The QWERTY layout of keys on a computer keyboard remains the same as that on a typewriter and the risk associated with the repetitive nature of using a computer keyboard remains the same. Today that risk has broadened to encompass everyone using a computer keyboard rather than an industry specific group.

Previously, training in the appropriate manner in which to use ergonomic equipment, how to avoid or reduce the risk of OOS and how to support your fellow workers is a course module taught in conjunction with *touch keyboarding* in the trade Business Services course. In association with this, the computer operator is encouraged to develop good habits in posture and work habits to enhance efficiency and good health.

With new OH&S legislation, industry and educators, together with managers, supervisors and colleagues, are responsible for the appropriate training and supervision of students and peers in how to minimise the hazards involved in operating a computer keyboard.

Response To Current Issues

As with any educational system there is a process of evolution within the curricula. The roll out of computers to primary and secondary schools, nationalisation of the Australian Training Framework, introduction of VET in Schools, diversification of training providers and the new legislation - Occupational Health and Safety Act of 2000 (NSW Consolidated Acts, 2000), are catalysts for change in the educational curricula in NSW.

The affects of these changes are only now beginning to emerge. Integration of ICT within primary and secondary, an ANTA review of the Business Services course in 1998, the articulation of VET in Schools and traineeship graduates to other institutions and the ramifications of OH&S Act - Risk and Hazard assessment for employers, educators and students, should increase the awareness and understanding of students and educators of the need for training in OOS.

With regard to the NSW Department of Education and Training, there is some evidence to support this awareness and there is concern that the level is still very low and with minimal reinforcement through assessment such as those introduced recently (Computer Skills Assessment Year 6 and 10, 2003).

The importance of *touch keyboarding* within the National Training Packages appears to be diminishing with dedicated modules in keyboarding changing from core to elective.

In industry, employment vacancies advertised in newspapers no longer require employees to demonstrate *touch keyboarding* as a prerequisite to employment when operating a computer. Employers are encouraged to provide traineeships for employees and school students with a greater emphasis placed on training at the workplace. Where *touch keyboarding* is no longer an employment requirement, many trainees may have no opportunity to value or learn the skill when learning on-the-job.

The implications of the OH&S Act of 2000 within the classroom and the responsibilities placed upon the employer and educators appear to be non-existent at this time.

Given the above, *touch keyboarding* appears to be overlooked and undervalued in our employment and educational communities today.

Research Questions

As an educator and author involved in teaching *touch keyboarding*, I am concerned at the reduced importance associated with *touch keyboarding* observed over recent times. This appears to be inconsistent with the increased demand of students and staff within schools, university and in industry to use a computer keyboard and the increasing number of computers available.

These concerns result in the following research questions:

1. Is *touch keyboarding* accepted as being an important skill? If not, why not?
2. What are the current practices for teaching and learning *touch keyboarding* in educational institutions in New South Wales, Australia?
3. Why is “*touch keyboarding*” not preferred to “*hunt and peck keyboarding*”?
4. What do educators feel are the issues in teaching and learning *touch keyboarding*?
5. Where is *touch keyboarding* an essential requirement in educational institutions in New South Wales, Australia?
6. As the national training package for Business Services is now delivered by technical, secondary and industry sectors, how does this affect “*touch keyboarding*”?

This thesis will explore the questions listed above. The next chapter will look at the available literature on the subject of *touch keyboarding*.

CHAPTER TWO: LITERATURE REVIEW

Introduction

The literature chapter will investigate the rhetoric, practice and issues in teaching and learning *touch keyboarding*. The rhetoric embraces national context, definitions, legislation and research papers found to include aspects of *touch keyboarding*. The practice focuses on the teaching and curricula within New South Wales Australia, the resources available nationally, on current local, national and international learning practice and the assessment mechanisms used. The issues arising from the rhetoric and practice within the literature encompass teaching, learning and the acquisition of *touch keyboarding* skills.

Rhetoric

National context

National goals

The national direction is clearly outlined in the “Learning for the knowledge society: An education and training action plan for the information economy” (DETYA, 2000). At State and Territory level, individual curricula documents provide clear direction with supporting infrastructure and professional development for teachers, together with computer literacy competency and testing for students and pre-service teachers, with stakeholders defined as “ *governments, education and training providers and the private sector – can work jointly to achieve common national goals.*” (DETYA, 2000, 12).

Where computer literacy is a goal and forms part of the curricula, it is up to the stakeholders to define and promulgate means of achievement. Curricula documents, institution and course literature, information days, newsletters, careers advice, bridging and induction programs represent some ways to meet this responsibility.

Testing of computer competencies is one practice most States and Territories engage in, which both advertises and assesses the basic level of skill within the test group. Institutions, who provide recognition of prior learning for previously acquired basic

computing skills, recognise the value of learning and illustrate that the institution recognises various other ways of acquiring this knowledge.

Computers – a basic tool

“Computers are now a basic tool of learning and teaching,” NSW Minister for Education, John Watkins (NSW DET, 2000).

The Minister’s statement illustrates a belief of the everyday and educational value of computers through the term “basic tool”. If computers are a “basic tool” then a large cross-sectoral component of students, teachers and lecturers are accessing a computer via a QWERTY keyboard today. This highlights the change in what was previously considered a *Trade Skill* to that of a *Basic Tool*.

The recent Education Amendment (Computing Skills) Bill (NSW Legislative Assembly, 2003) legislates an amendment to the Education Act 1990 that requires candidates for the School Certificate to be tested for computing skills. This is to be implemented statewide by 2006.

In 2002, the computer skill levels for graduating teachers, Year 6 and Year 10 students were assessed and a whole school curricula in information technology is being designed. Table 1 lists policy statements designed to encourage and mandate the focus on computers being a basic skill necessity within educational institutions in New South Wales, Australia:

Year	New South Wales Policies for Computing Skills in Schools
1997	Computer Proficiency for Teachers, Ministerial Advisory Council,
2001	Trial Computing Skills Test for Year 10, NSW Board of Studies, Year 10
2002	Computer Skills Assessment Year 6, NSW BOS Year 6
2002	K-12 Information and Software Technology, NSW BOS
2003	Education Amendment (Computing Skills) Bill, NSW Legislative Assembly
2006	School Certificate (Mandatory Computer Skills Testing, NSW Legislative Assembly

Table 1 New South Wales Policy Statements for Computing Skills in Schools

What will be discussed in more detail within the *Practice* component of this chapter is the total lack of acknowledgement of *keyboarding* or *touch keyboarding* as a component of “*computers as a basic teaching and learning tool*” (NSW DET, 2000).

Additionally, within the *Agenda for a Knowledge Nation* (Chifley, 2001) is a recommendation to make ICT literacy a core component of learning alongside literacy and numeracy. This in turn flows on to educational institutions and there is an expectation that teaching staff and students will access computer technology. This increases the dependence on *keyboarding* within an educational setting.

Definitions

Keyboarding terms

A great deal of confusion can arise from miscommunication where the definition of important terminology is missing or unclear. For that reason, it is important to define the language and understand exactly what is being discussed within this literature review.

The NSW DET provided definitions for *Keyboard Familiarity* and *Keyboard Skills and Touch Typing*:

Keyboard familiarity is knowledge of the function and position of single keys and combination of keys on a computer keyboard. Keyboard skills and touch typing refer to the ability to use one’s fingers correctly on the keyboard with accuracy and skill (NSW DET, 1997, 115).

Within a teaching text, McLean (1994) identifies “*keyboarding*” as *applying to any situation for which the term “typewriting” was originally applied*. In addition, McLean extends the definition of “*keyboarding*” to include “*the applications which the keyboard is used, regardless of the equipment involved*.”

Given the above definitions, the definition of *touch keyboarding* will be explored further. This thesis will adhere to a fairly simple, all encompassing set of NSW DET definitions (1997), as set out above.

When reading this thesis the terms *touch keyboarding* or *touch typing* are used. *Touch keyboarding* refers to a person entering data via a computer keyboard and *touch typing* refers to a person entering data via a typewriter.

Conversion of terminology from touch typing

In 1991 Standards Association of Australia produced the standard AS 2708 Keyboarding speed tests (formerly known as ‘Typing speed tests’) (Standards Association of Australia, 2001). This standard provides an industry reference to the change in terminology from ‘*typing*’ to ‘*keyboarding*’. As computer users were keyboarding on personal computers from 1984 onwards, the broader community were generally using this term in the late 1980’s.

Educators identified as a keyboard operator

The early identification of keyboarding within an employment role should trigger certain support mechanisms. It is the concern of the researcher that the tasks required of an educator are very similar to that of the *keyboard operator* described below and yet this is not clearly identified in any of the academic employment contracts received by the researcher.

In looking at the definition and tasks of a *Keyboard Operator* it is possible to recognise a similarity in tasks to that of any person required to input and process data using computers. The tasks outlined in the Australian Standard Classification for a *Keyboard Operator* (Australian Bureau of Statistics, 2003) are:

- ❑ Typing reports, letters, statistical tables etc using a keyboard
- ❑ Transcribing information recorded in dictating machines
- ❑ Proofreading and correcting copy
- ❑ Filing records and reports
- ❑ Typing in data and codes required to process information
- ❑ Sorting outgoing material
- ❑ Preparing documents for submission

Where an employee is identified as a *keyboard operator*, there are associated supportive mechanisms to reduce the opportunity of OOS and increase awareness of best practice with regard to human ergonomics. Without being identified as *keyboard operators*, there is a concern that these supportive mechanisms will be omitted.

Australian Standards and Regulations affecting computer keyboards

This section will identify the Australian Acts, Regulations and Standards, New South Wales Department of Education Ministerial Directives, State Wide Assessments and curricula documents.

Australian Standards for keyboard layout

In Australia, when purchasing a personal computer, whether IBM compatible or Macintosh, a standard keyboard is available as shown below. The layout of the keys is called “QWERTY” after the top left hand side of alpha keys.

From the 1878 Typewriter Patent Drawing (Earthlink, 2003) below, it is easy to recognise various similarities in the layout of the alphabetic and numeric keys.

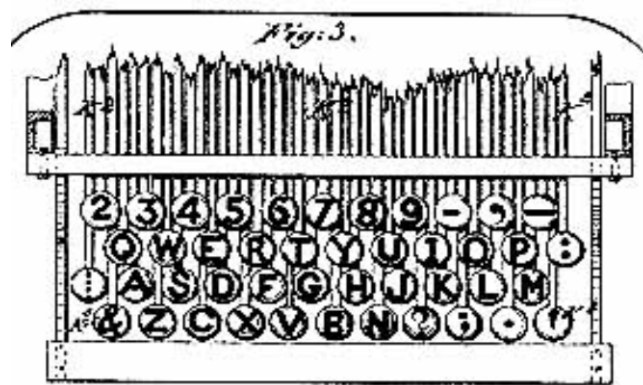


Figure 1 1878 Typewriter Patent Drawing

The Windows Software Activated Keyboard (2003) displayed below displays additional function keys, directional arrows, numeric keypad and indicator lights. It should be pointed out that the main layout of alphanumeric keys is identical to the 1878 Typewriter Patent Drawing. (The “M” key and the addition of the ‘1’ are the exceptions.)



Figure 2 2003 Windows Software Activated Keyboard

The Australian/New Zealand Standards specify certain characteristics and requirements pertaining to the manufacture and layout of a computer keyboard for sale within our country.

AS/NZS 4395.2:1996 (Standards Association of Australia, 1996) includes the keyboard layout displayed below. While this is a “sample” arrangement for the locations of keys, the “QWERTY” keyboard layout is not specifically recommended within the Standard. The Standard may imply recommendation of the “QWERTY” layout by using the layout rather than using a random display of characters.

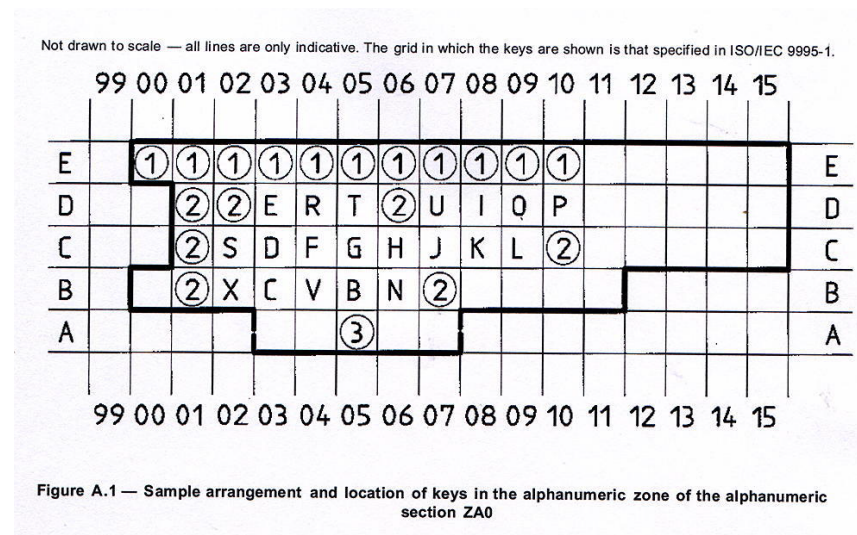


Figure 3 Sample arrangement and location of keys

The Australian Standard AS 2287, which specifies the arrangement of alphanumeric characters of the keyboard, is currently withdrawn with no replacement issued to date. It may appear that there are no current requirements to retain the “QWERTY” layout of alphanumeric keys on a computer keyboard.

It is important to note that all Standards refer to employment, employees and work related activities. Educational environments and wide ranging physical size of students are not specifically mentioned within the Standards. This may be reflective of the composition of the individual Standards Referencing Committee or the time lapse between change of practice and recognition of change of practice within the Standards.

Occupational Overuse Syndrome

In an office, any person operating a computer will need to be aware of the ergonomic requirements recommended under the OH&S Act of 2000 (NSW Legislative Act, 2000). Employers, managers and employees require training and assume legal responsibilities under this legislation with respect to care for themselves, peers and subordinates.

Within the *Guidance for the Prevention of Occupational Overuse Syndrome in Keyboard Employment* (1996), training and education are an effective strategy in the prevention of occupational overuse syndrome. Training and education are recommended for different groups throughout an organisation. Managers, supervisors, keyboard users, authors, health and safety representatives and staff responsible for selecting furniture and equipment. The following extract from the National Occupational Health and Safety Commission (1996, 2) relates specifically to computer keyboard usage.

Where employees are using computer keyboards, appropriate aspects of training would include:

- ❑ *Keying skills and techniques. Where appropriate, training in touch-typing should be provided*
- ❑ *Correct use of furniture and equipment*
- ❑ *Efficient work postures and the importance of movement and change of posture*
- ❑ *System capabilities and limitations*
- ❑ *Role of the supervisor*
- ❑ *Resources available for assistance*
- ❑ *Correct work practices and their importance – overtime, peak demands, task variation, work pauses*
- ❑ *Early detection and reporting procedures for health or safety problems, such as occupational overuse syndrome*

There is a clear need for training and awareness of health risks relating to industry practice. Equally there appears to be minimal attention to training in the awareness of these matters within the literature surrounding computer use within the education sector.

Duty Of Care

Occupational Health and Safety Regulation 2001 (NSW Legislative Act, 2000) under the Occupational Health and Safety Act 2000 (NSW Consolidated Acts, 2000) is based upon the principle of *Duty of Care* and covers all workplaces in NSW (except mines). The Occupational Health and Safety Regulation provides an explanatory overview (NSW Legislative Act, 2000,1):

The new Regulation contains provisions in respect of the following matters:

The identification of hazards by employers and the elimination or control of risks at employers' places of work,

The establishment of occupational health and safety committees and the election of employees' representatives in connection with an employer's duty under the Act to consult with employees in respect of decisions affecting their health, safety and welfare at work,

The duties of a controller of premises used by people as a place of work to identify hazards and eliminate or control risks at the premises,

Particular risk control measures (including provisions regarding lighting, noise, atmosphere, electricity, confined spaces and manual handling),

The educational employer is responsible for training the classroom educators in how to maintain their duty of care. The classroom educator is responsible for maintaining the wellbeing of their students. Educational employers and educators would be wise to follow the example set by industry and technical institutions with regard to *touch keyboarding* and the computer environment.

Identification of potential hazard

Touch keyboarding is identified as a potential hazard. There are many hazard checklists available. In the attached document Appendix A: Hazard Checklist (Australian Government, 2004, 64) asked the following question in getting started on identification of hazards in the office.

Are highly repetitive tasks (such as keying) performed for more than 2 hours at any one time?

As an aside, in preparing this thesis, the answer to that question would be a resounding **YES**. Further questions involve questions concerning staff training in workstation adjustment, provision of footrests, document holders and appropriate chairs.

Students surveyed within UoN access a computer between 2.8 to 3.7 hours per week. It would be interesting to pose the same question specifying the end weeks of semester as a timeframe. As detailed in the Handbook Ergonomics (Standards Association of Australia, 1994) time management and meeting deadlines are factors that may divert good intentions to continue good ergonomic work habits due to pressure of assignment deadlines.

In relation to the Occupational Health and Safety aspects of computers within a classroom, there is evidence of growing awareness of the need to monitor, train and manage the classroom environment. Examples of this are:

- ❑ An article in the Classroom Magazine entitled *Time to Pause* discussing Repetitive Strain Injury (RSI), the need for regular breaks and provides a series of stretching exercises and a poster for the classroom. (Time to Pause, 2001).
- ❑ A second article in Netguide for “Newbies” *Your guide to using your keyboard* encourages correct posture, regular breaks, use all fingers and utilise a document holder (Netguide, 2003).
- ❑ 2001 School Certificate Test – trial computing test included a question on the design of a computer workstation on the comfort and efficiency of a computer operator (NSW DET, 2001).

The low level of awareness found in the educational literature contrasts dramatically with the high level of awareness within the vocational experience of the researcher. Within vocational education there is an Occupational Health and Safety module within each National Training Package (NTIS, 2004.)

The keyboard: critical interface between man and machine

There appears to be no current available research into why *touch keyboarding* is an important skill to learn nor how *touch keyboarding* assists in the efficient use of a computer. *Touch typing* as a skill developed through annual competition in the United States of America. In 1888, a competition between two men resulted in the man using *touch typing* winning the contest. One contestant used the sight method of keyboarding and the second used a method of typing without looking at the keys. This second method demonstrated the gains to be made in speed through *touch typing* (Mackay and Williams, 1978, 119).

There is an absence of current research in relation to *touch keyboarding* and in discussing this research drought, McLean (1994, iii) advises:

The field of business education is in crisis. While keyboarding and its attendant computer applications continue to be the mainstay of business education, the universal application of computers to every field means that every other field is also claiming computers as appropriate to that field. With this challenge before us, the paucity of research in business education, a situation largely unchanged since 1978 when the first edition was written, continues to plague us. Very little has been done to replicate on the computer earlier research conducted on the typewriter. ... If we are to remain a viable player in the K-12 curricula and perhaps even beyond, we must instil among teachers, students and teacher educators the need to conduct solid research to strengthen the field.

Literature search techniques

At all times the primary source of information was located to ascertain the “raw data” (Booth, Colomb & Williams, 2003). Secondary sources, for example McLean (1994) was originally published in 1982 and referred to the studies by Haefner (1932) and Wood and Freeman (1932). In following this strategy it became apparent that there were very few recent texts or research devoted to teaching and learning *touch keyboarding*.

As stated above, there is an absence of current research into why *touch keyboarding* should be taught. This excludes the volume of texts on “how to learn *touch keyboarding*”. To arrive at the statement that there is an absence of current research

requires backup and the following methods were utilised and failed to uncover current research or research conducted over the last 30 years:

- ❑ Internet searches on Google and Yahoo search engine and Dogpile metasearch engine using words and phrases including touch keyboarding/touch typing/typing/typewriting/data entry/keyboard entry/computer keyboard and then adding teaching, learning and keystrokes to these words
- ❑ Database searches on ERIC, Expanded Academic ASAP, Kinetica
- ❑ Locating and reading articles and texts, then tracing journal articles and texts from other articles from secondary source back to the primary source
- ❑ Sourcing the reference lists for vocational teaching qualifications in Word Processing and Keyboarding offered in NSW Australia
- ❑ Sourcing Australian Standards relating to Ergonomics, Keyboard Manufacture and Speed and Accuracy Testing of Touch Keyboarding
- ❑ Purchase of second hand texts when research projects and/or teaching and learning texts were out of print
- ❑ Interlibrary borrowing of masters and doctoral theses (eg Maguire, 1994) explore issues in teaching computer keyboarding to primary students.
- ❑ Purchase of publications from Commercial Education groups in Australia, United Kingdom and United States of America not available through Internet or library access

Ordinary writing tool

With the development of the typewriter and the successful demonstration of touch typing, came the development of touch method of typewriting. West (1969) states that the processes involved in teaching a 9 year old to *touch keyboard* is identical to that of a 19 year old. The content and texts of the training may vary but the processes are the same.

In teaching and learning *touch keyboarding* one of the major issues is the national goal of ICT (Commonwealth Government, 1999). With the embedding, value adding and integrating of ICT, the skill acquisition required to support them is often overtaken by the focus on the end results.

In discussing the background to teaching and learning typewriting skills, West quotes 1969 figures of employment and enrolment in classes and sales of typewriters as evidence of typewriting going beyond the mere walls of employment. West (1969, 21) suggests that given these figures that typewriting should be recognised as “*an ordinary writing tool useful to nearly all persons and thus to be made available to all.*”

West further states that if teaching is not the purpose or end of the learning but a mechanism to fulfil the purpose of the learning (p18) then perhaps *touch keyboarding* is the mechanism (skills) for fulfilling the embedding of ICT.

It would be interesting to see what West would make of the number of computer keyboards sold, Email and internet accounts taken up by students in educational institutions in the 2000's.

West's statement made nearly four decades ago (1969, 33) remains relevant today.

“Touch typing is an ordinary writing tool useful to all persons and thus to be made available to all.”

Teacher standards in ICT

The Commonwealth Department of Education, Science & Training (2002), in the ICT Competency Framework for Teachers addressed the skills and knowledge of a diverse group and developed a set of standards for teachers. This relates to the use of ICT in the curricula and efforts to incorporate those standards into human resource management within educational authorities and schools. Whether to define or to contain, the Framework project definition of the notion of competence and its (Commonwealth Department of Education, Science & Training, 2002, 13) “*use of ICT is broader than the technical skills needed to use ICT. In this project a technical view would exclude or deny the plethora of skills teachers require to create meaningful and productive learning contexts for students.*”

There are two concerns raised by this project. The first is the timing, when a set of standards for teachers are being developed in 2003 for the use of ICT. There are teachers within the education system who have been teaching with technology for over

two decades. As stated within the Handbook Ergonomics (1994) humans find it difficult to change an established habit even when the reason for change is valued.

The second concern is the decision to not take a technical view of ICT. While this may reflect time, financial and experiential considerations as described by Wynder (2001) there is a concern that the pursuit of the creative will deny the value of the practical use. For example within the teaching delivery style of Problem Based Learning, one feature is the introduction of skills at a time appropriate to support the creative element of problem solving. As an experienced ICT teacher, the researcher is concerned that the importance of the technical skills is unclear and that the timing for introducing the above standards may prove difficult for some teachers to accomplish.

Current texts in learning to teach touch keyboarding

Many of the available texts, for example McNicol (1968), West (1969) and Mackay and Williams (1979) focus on the methodology of teaching how to acquire the skill of *touch keyboarding* on a typewriter with a QWERTY layout. As the main texts were published in the '60s, '70s and '80s, the purpose and placement of *touch keyboarding* within the vocational education sector was clear and unquestioned. The question of why learn the skill of *touch keyboarding* in the 20th Century was clearly answered with vocational need where speed, accuracy and efficiency were in high demand from government and commercial employers.

The above texts remain on the reference list for the Teaching Certificate in Word Processing and Keyboarding in 2004 (CESA, 2004) and on the reference list for the researcher's Teaching Certificate conducted in 1987.

Computer software packages for learning touch keyboarding

There are several computer software packages available to assist in the self-tuition of *touch keyboarding*, for example Mavis Beacon (2004) and Typequick (2004). These offer step-by-step instructions using exercises, remedial exercises and drills to assist in acquiring *touch keyboarding* skills.

No computer software packages are on the reference list for the Teaching Certificate in Word Processing and Keyboarding in 2004 (CESA, 2004), the reference list for the

researcher's Teaching Certificate conducted in 1987 nor were they any part of vocational and tertiary teaching experience or employment experience of the researcher.

As the instructional texts, for example McNicol (1968), West (1969) and Mackay and Williams (1979), were written before the computer software packages were designed, the packages do not feature as a learning strategy within these texts.

A computer software package was used to teach Year 2/3 students to *touch keyboard* as part of a research study by Maguire (1994) in a Victorian primary school. Students were able to acquire skills however Maguire did find it difficult to facilitate given his limited personal skills in teaching and learning *touch keyboarding*.

Whether using a software package or a trained teacher and keyboarding text to acquire *touch keyboarding* skills, this project is about describing the current context of issues in teaching and learning *touch keyboarding* not the promotion of one learning strategy over another.

Keyboard layout - QWERTY vs. Dvorak Simplified Keyboard

A significant research study by Dr August Dvorak over a 20 year period investigated "Typewriting Behavior" (Dvorak et al, 1936) with a comparison in time and motion study between the standard layout (QWERTY) and the Dvorak-Dealey "Simplified" Typewriter Keyboard as display below.

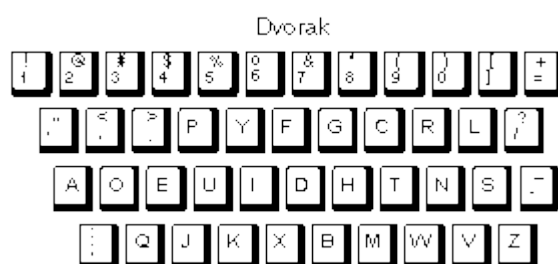


Figure 4 Dvorak Simplified Keyboard (2004)

Although a significant amount of research was undertaken on the Dvorak Keyboard, there is no evidence by way of instructional texts, references in curricula, journal articles or in testing standards to suggest that this keyboard layout is widely used.

However, it is still a valid keyboard layout at Microsoft Windows 95 and subsequent versions of the graphic user interface offer the Dvorak Keyboard Layout (2004) as an

alternative. Consequently, the computer operator using a standard keyboard will need to ignore the QWERTY layout printed on the keys in order to operate using the Dvorak layout.

As discussed earlier the QWERTY layout is not specifically required under the Australian Standard for keyboard manufacture, nevertheless, it is certainly implied by the keyboard layout illustrated in the Standard documentation.

The Dvorak keyboard is outside the professional and educational experience of the researcher. This keyboard has been available as an alternative for many decades in the United States of America and through the operating system of personal computers, but is totally unknown in Australia.

Research and development into ergonomic keyboards

Given the absence of research concerning *touch keyboarding* outlined above, there is evidence of research and development of the computer keyboard itself. The following keyboards offer variation on the original Qwerty keyboard layout of the late 19th and 20th Centuries. The standard method of pressing a key to enter data into a computer keyboard remains a constant, the varying factors are the physical angle, height or location features of the keyboard.

The value in selecting a keyboard for personal use is only of value when the greatest proportion of time is spent on the same style of keyboard. Students and educators who are constantly moving rooms, computers and keyboards would find it a nuisance or time consuming when changing styles.

Ergonomically Styled Computer Keyboards	
	Tactus Keyboard (2004) This standard Qwerty layout is supported by raised edges on certain keys to assist in typing in data. 
	GoldTouch keyboard (2004) This standard Qwerty layout is split to allow a more natural posture.
	Kinesis Maxim Adjustable Keyboard(2004) This standard Qwerty layout is split and raised to allow a more natural posture.

Table 2 Ergonomically Styled Computer Keyboards

School students can learn to touch type/keyboard

There are two early studies (Wood and Freeman, 1932; Haefner, 1932) that provide evidence of how to integrate technology within the primary classrooms and the effect of that integration. These companion studies were conducted in 1932 and provide a depth of understanding, application and knowledge into determining the value of the typewriter as an instrument of learning and how to apply it within the learning environment.

Results yielded by the Wood and Freeman study (1932) indicated that children in primary and secondary school can acquire typewriting skills as a communication tool and as a way of encouraging and developing good habits in using the typewriter. Haefner's companion study (1932) allows a certain insight into the embedding of technology within the curricula. It moves beyond the question of can primary students acquire the skill to how to apply and what are the benefits from using the technology.

As detailed in the personal background of the researcher, an action research study (NSW DET, 1996) successfully introduced primary students to learning how to *touch keyboard*. This is further supported by a Master Thesis where *touch keyboarding* was taught to a primary 2/3 year in Victoria, Australia (Maguire, 1994).

There is evidence that students can learn how to *touch keyboard* and *touch type*. What is not replicated with a computer keyboard is the 1932 typewriting studies which are “what are the benefits of acquiring the skill or the benefits of using the technology?” There is ample evidence of the benefits of using ICT and the absence of evidence and even the absence of discussion about the benefits of acquiring the skill of *touch keyboarding* is a major reason for the focus of this thesis.

Practice in Touch Keyboarding

This section is an overview of the current practice in teaching and learning *touch keyboarding* as described within the literature. The premise of looking at the literature dealing with current practice is one element within investigation of the current state of affairs of *touch keyboarding*.

Access to technology within the educational agenda

NSW Technology Budget for 2002-2003

The New South Wales Department of Education and Training demonstrates a strong commitment to computer technology within our school system. A budget (NSW DET, 2003) allocation of \$963 million over a four-year period included increasing the current number of school computers to 135,000, which in turn reduces the computer/student ratio to 1:5.6.

NSW School Education Budget Overview	2002-2003
Technology and Computers budget for 2003-2006 (NSW Government Budget, 2002)	\$963 million
No of computers in schools computers (NSW DET, June 2003)	135,000
Estimated enrolments in 2002/2003 (NSW Government Budget, 2002)	757,000 plus
Computer student ratio (NSW DET, June 2003)	1:5.6

Table 3 NSW School Education Budget Overview

NSW schools and colleges access to ISP services

As outline in a journal article from the Curriculum Directorate, (NSW DET SCAN 2004) the NSW Government in 2002 and 2003 will provide for schools and TAFE:

- ❑ Personalised Email accounts for teachers and students
- ❑ Filtered web facilities for individuals, students and colleges
- ❑ Teacher discussion groups
- ❑ Student discussion groups
- ❑ Listservs

These new Internet Services and Projects (ISP) are designed to enhance learning, foster collaboration and assist in problem solving activities and construct knowledge building.

What was not discussed is how teachers would implement the usage of ISP within a full curricula and stretched classroom timetable. Professional development assistance for educators to understand, access and utilise the above services is also missing from the article. These are to be discussed further in the Issues section of this Chapter.

Professional development for touch keyboarding

Within the Vinson Report (2002) the dollar value budgeted for Professional Development in NSW schools is \$25 per teacher per year. Given the budgetary amount of \$963 million allocated to technology and computer budget above, the \$25 in a year when a new teaching method “productive pedagogy” is being introduced, may not be able to adequately support the delivery and integration of the infrastructure involved.

The University of Newcastle (UoN) student enrolments and academic staff appointments identify a total of 23,721 people accessing technology in 2003 (UoN Statistics, 2004). Currently there are no staff development opportunities offered by the University to assist staff in acquiring *touch keyboarding* skills. Staff wishing to acquire these skills need to teach themselves, learn online or enrol in a course offered by another institution.

For students, there are winter/summer short computer bridging courses offered to Open Foundation and Undergraduate students that offer students an opportunity to acquire *touch keyboarding* skills. Students at the UoN spend an between 2.8 and of 3.7 hours

per week (University of Newcastle, 2002). As observed by the researcher, many students in the bridging courses enrol with little or no keyboarding and computing skills. Although these courses are offered at a reasonable cost and offer excellent support, there are a number of vacancies at each delivery.

Touch keyboarding within the curricula

USA – home of touch keyboarding

In the United States of America (USA), *touch keyboarding* is firmly placed in the primary, secondary, technical and tertiary curricula. Jefferson County (2002) is but one example of a clearly identified place which values and carries out testing of *touch keyboarding* within a primary and secondary technology plan and curricula. (See Appendix B.)

In particular, a focus on acquiring the skills of *touch keyboarding* is part of School Technology Plans with outcomes linked to testing and specified speeds. These speeds increase in difficulty as students progress through their schooling (Jefferson, 2002). Of interest is that some of these schools are facilitating this through the use of Business Educators coming in to primary and secondary schools to deliver the *touch keyboarding* instruction (Sormunen, (2003).

In viewing the increase of composition at a keyboard rather than transcription, it is worth noting that the term “composition” is linked to *touch keyboarding* in curricula documents in different educational sectors in the USA. Several examples are given below to illustrate how this term is used in learning objectives:

- ❑ “Standard 4 within Keyboard Applications – the student will improve *composition and editing skills*” (Granite School District, 2004)
- ❑ “Develop “*thinking*” skills to develop *composition skills at the keyboard*” (Matlow College, 2004)
- ❑ “Begin keyboard composition by responding to questions” (Illinois Business Education Association, 2004)

The literature review did not focus on composition at a computer keyboard and for that reason, the value of touch keyboarding in developing composition skills at a keyboard remains an unresolved issue within the thesis.

National change to curricula

Within the Certificate II in Business Administration in Australia, learning how to *touch keyboarding* was a core module within the national training package. With the nationalisation of training packages through the development of the Australian Qualifications Framework in 1995, acquisition of *touch keyboarding* skills became a national requirement.

Technical institutions are the traditional deliverers of trade skills and *touch keyboarding*, since development of the skill in the early 20th Century, was a core component of the secretarial occupation. Change came in the form of a national review of the Business Services Training packages in 1998 (ANTA, 2002).

The importance of *touch keyboarding* within the National Training Packages appears to be diminishing with dedicated modules in keyboarding changing from core to elective. The National Training Modules (1993) identify prerequisite and corequisite modules in *Keyboard Techniques and Operation* and *Keyboarding Speed and Accuracy*. (See Appendix C.)

The following table details the qualifications offered by the different sectors in New South Wales, Australia. Vocational Certificates offered in school are called Vocational Education and Training (VET) in Schools (ANTA, 2002).

Schools sector	Vocational education and training sector	Higher education sector
Certificate II Certificate I Senior Secondary Certificate of Education	Bachelor Degree Advanced Diploma Certificate IV Certificate III Certificate II Certificate I	Doctoral Degree Masters Degree Graduate Diploma Graduate Certificate Bachelor Degree Advanced Diploma

Figure 5 Qualifications According to Educational Sectors in New South Wales

A significant change is that an assessor is to be responsible for determining whether *touch keyboarding* is a necessary skill on an individual task basis. This brings into the mix a number of variable factors that can directly affect the national standard of student outcomes.

Other variables are assessor's experience, skills and beliefs, the workplace environment, employer's understanding and perception of job requirements. This will be further discussed under the issues section.

As national training packages are now being delivered in the vocational, secondary and industry sector and there are variable factors becoming evident, the consistency of student outcomes may come into question. This is outside the boundaries of this research project and will be recommended for further investigation.

Intrastate

Within NSW, schools and technical institutions are now delivering the Certificate II in Business Administration to HSC students.

A major significant change when delivered at school is the agreement by ANTA and NSW DET to modify the experience and qualifications of VET teachers in schools in comparison to VET teachers in technical institutions. This translates to a reduction in experience from three (3) years of current industry experience to two (2) weeks of current industry experience. Within the Industry Curriculum Framework Information Package (ICFIP) a trade qualification one level higher than the one being delivered is now reduced in schools to that of the certificate being delivered (2002).

At the same time the NSW BOS in approving the delivery of VET in Schools requires each student to complete 70 hours (2 weeks) relevant work experience. HSC students at school when completing their certificate will have the equivalent certificate and experience as their teacher. The teachers have the benefit of teaching qualifications and experience but in relation to teaching a trade may be perceived as "peer tutoring".

Matrix of documentation

Within Appendix D, there is a list of reference texts, curricula, legislation and research pertaining to this thesis. Appendix F, Analysis of Student Keyboarding Texts identifies a range of texts from 1946 to 2002. Appendix G, Analysis of Keyboarding Teacher Texts identifies texts from 1932 to 1979. The student and teacher texts demonstrate that there are a range of similarities to be found among them.

Within the reference documentation in Appendix D the majority refer to keyboarding, however a lesser number identify keyboarding as a health risk and even fewer refer to *touch keyboarding*. Considering this list refers to the period 1993 to 2004 it is of concern that *touch keyboarding* is diminishing within the national curricula.

Testing acquisition of skills

Australian Standard Keyboarding Speed Tests

AS2708—2001 Australian Standard Keyboarding Speed Tests sets out a method for the conduct, assessment and certification of keyboarding speed and accuracy tests conducted in the English language.

These tests provide a standard method of comparing the skills of different people. Although comparison for employment is no longer a requirement, the test is still a valid way of measuring improvement of the acquisition of the skill.

NSW Police Force entry requirements

The New South Wales Police Force (2003) is one of few employers who have consistently required the employees to be able to demonstrate *touch keyboarding* skills under the Australian Standard 2708 conditions. Within the recruitment information it states:

“Applicants are advised that prior to any police employment, they are required to personally obtain Certification of ability to type a minimum of 25 wpm with 98% accuracy...” (NSW Police Force, 2003, 16).

Even the terminology “type” alludes to a bygone era. The Police Force employees were typing on manual, then electric typewriters and moved seamlessly onto typing on computer keyboards. When the technology was updated the employees using typewriters were the same employees who moved on to computer keyboards.

This is very different to the situation in most business or educational environments. With the introduction of computers came a redefinition of roles and employees were asked to multitask and be more independent of administrative services. This was certainly the researcher’s experience at NCAE and UoN.

Prior to entry, the NSW Police Force continues to require applicants interesting in joining the force to demonstrate their *touch keyboarding* skills to the AS2708.

Commercial Education Society of Australia

The Commercial Education Society of Australia (CESA) is a non profit organisation providing testing for 94 years. This organisation offers nationally recognised examinations for Teaching Certificates in Typewriting and developed a Teaching Certificate for Word Processing in the late 1980s. These Certificates are now combined within a Teaching Certificate for Keyboarding and Word Processing. In 2004, the CESA newsletter (January) continues to offer membership of its professional organisation and an independent skills testing service.

In CESA’s long established reputation for developing rigorous qualifications, it will offer a Teacher’s Certificate in Office Administration this year, in addition to its Bookkeeping, Keyboard and Word Processing and Office Technology. These qualifications were approved under the AQTF and although this will no longer be pursued, the high standard will no doubt continue.

Mandatory testing

Year 6 - In extracting the relevant sections of the Year 6 ICT Computer Skills Assessment (CSA) Skills (2004) relevant to *keyboarding* it appears that the mandatory testing is focused on technical skill at the lower end of the skill development – *keyboard familiarity*.

Using computer based technologies to manipulate, create, store and retrieve information and to express ideas and communicate with others.

Computer Skills Assessment Year 6 ICT Skills	
Word Processing	Locates and uses return/enter, delete/backspace, shift, capslock Types sentence(s) without assistance Understands use of tab to indent Uses appropriate terminology – font, upper/lower case, bold, italic and bold
Computer operations and concepts	Identifies hardware components eg keyboard, mouse, monitor/screen

Table 4 Computer Skills Assessment Year 6 ICT Skills

Year 10 – The following places the assessment within the NSW DET context of *keyboard familiarity*.

Year 10 – Trial Year 10 Computing Skills Assessment 2003

1. Operate effectively within the desktop environment f. Identify ergonomic and OH&S principles related to computer use
4. Demonstrate basic word-processing skills as they create, work with and modify text document.

Table 5 Year 10 – Trial Year 10 Computing Skills Assessment 2003

The above testing could be argued to test for minimum skill levels within students. There is the opposing argument that students with *touch keyboarding* skills may be at a distinct advantage to those with *keyboard familiarity*.

Both the Year 6 and the Year 10 tests are timed, with the assessment geared to minimise the variable environmental aspects of schools, teachers, infrastructure and access.

Where the tests are timed and paper based (pen and paper instead of on a computer), *touch keyboarding* bears no immediate advantage, however, where the test is computerised the skill development associated with *touch keyboarding* and time efficiency may directly effect the outcomes for students.

Curricula and mandatory assessment

Within the NSW Department of Education (2004) documentation, observers may be misled by images of *touch keyboarding* on a presentation outlining the mandatory testing of CSA. Observers may assume *touch keyboarding* forms part of the testing when in fact *touch keyboarding* is not included in any part of the primary curricula.



Figure 6 NSW Department of Education Powerpoint Presentation (2004)

In viewing this photograph (NSW DET, 2004) on a multimedia presentation promoting the Computer Skills Assessment Year 6, it may appear through the addition of the photograph of a person displaying *touch keyboarding* techniques, that *touch keyboarding* formed a component of the test ergo the primary curricula.

In fact to use the DET terminology from 1997 only *keyboard familiarity* is assessed (for example which key would you use to press ENTER?) The Year 6 and Year 10 Computer Skills Assessments available to date, do not test for skills or knowledge associated with *touch keyboarding*.

As described in the journal article by the Curriculum Directorate (NSW DET SCAN 2004) the Year 6 paper-based assessments are focussed upon testing students knowledge and understandings in the use of word processing, graphics, Internet, Email, database and spreadsheets.

The article continues with the Year 10 computer skills test that includes:

- ❑ A school based assessment of computing skills
- ❑ An external pen and paper test of computing skills
- ❑ An electronic computing skills test delivered online

The tests assess ten core computing skills identified from the current Mandatory Years 7-10 Syllabuses.

Keyboarding within a support for instructional change

When viewing teaching with technology, Sandholtz, Ringstaff and Dwyer (1997), discussed “The Evolution of Instruction in Technology-Rich Classrooms”. The support for this defines five stages in the evolution: entry, adoption, adaptation, appropriate and invention.

In recognising that change is evolutionary it is suggested that incremental steps of implementation as shown above occur. This clearly places keyboarding firmly within the context of a technology-rich classroom and specifically located within the adoption stage of implementation.

As discussed in the Practice section later in this chapter, many educators find it difficult to move past the adoption stage. This research discusses a shared vision, reducing staff commitments outside the school, creating sharing opportunities for training staff. These views are also supported by the Vinson Report.

Computer skills set

There is a new set of Information Literacy Competency Standards approved this year (Association of College & Research Libraries, 2004). These are the domains of teacher librarians, who are often seen as the bastion of technology within the educational sector. Todd (2004) firmly recognises the major role of libraries. Specifically that teacher/librarians value the range of skills needed for survival in an information rich environment, even if at times this is a lone voice. Integrating new standards will place pressure upon the skill set of students and educators to enable the pursuit of the rich environment.

The continuous pressure for educators to integrate ICT in a meaningful manner is often not accompanied by a basic skill set with stated expectations for each Stage of the curricula. As experienced by the researcher, one higher goal is often unachievable without the skill set as valued by librarians (Todd, 2004). This will be emphasised further within the Curricula section of this chapter.

Keyboarding texts

As the QWERTY keyboard is a standard component in learning how to *touch keyboard*, the texts written for the purpose of acquiring the skills are all similar in their approach.

Over the decades the allocation of keys to an individual finger changed, the method of learning drills to the beat of a metronome or music and covering the keys with an apron or shield were not found to have a profound influence on the acquisition of *touch keyboarding*.

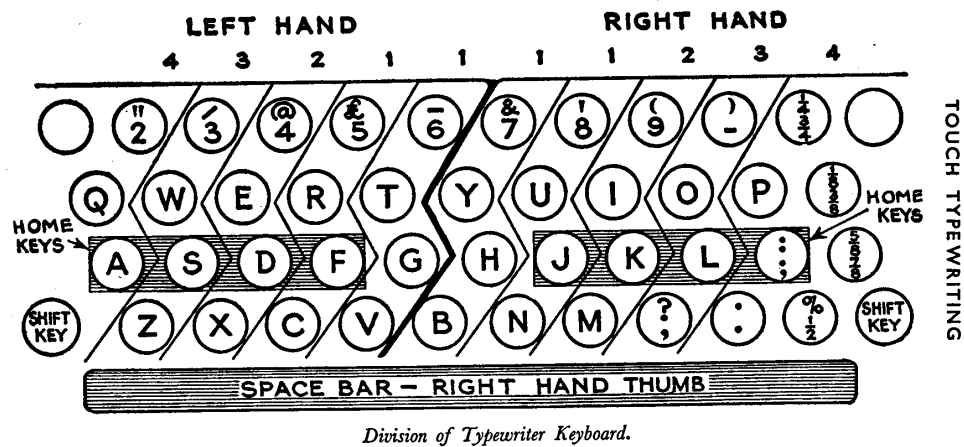


Figure 7 Qwerty Keyboard from Pitmans College (1962)

Touch Keyboarding: Barriers to Acquisition

Within the literature aimed at teaching and learning *touch keyboarding*, there is no major change in how to teach and learn *touch keyboarding* (see Appendix F and G). The texts reflect a small evolution of the skill in line with the minor layout changes and the additional of keys for the computer environment.

Therefore, given the status quo within teaching and learning strategies, there was a need to look more broadly afield to discover underlying issues affecting *touch keyboarding*.

Teaching touch keyboarding qualified educator

In acquiring a skill, an experienced mentor or teacher can be invaluable in allowing the acquisition to happen in an efficient and smooth manner. *Touch keyboarding* is no different and the value of a qualified educator is evident in texts written over many decades.

In order to teach students how to touch type, McNicol (1968, 2) stated:

The teacher must understand the subject, both as expert and learner and have knowledge of and competence in, the skill of teaching.

McLean (1994, iii) further supports a qualified educator when he recommends:

Anyone who wishes to learn to type should do so preferably under the tuition of a qualified teacher and at least with the aid of a good typewriting instruction book.

This is fully supported by the Vinson Report (2002, 69). The report qualifies by outlining the *Standards of Professional Practice for Accomplished Teaching in Australian Classrooms* specifically:

- ❑ *Exemplifying the qualities and values that they seek to inspire in their students, including authenticity, intellectual curiosity and rigour, tolerance, fairness, ethical behaviour, common sense, self-confidence, respect for self and others, empathy, compassion, appreciation of diversity and acknowledgement of cultural differences.*

Within technical institutions the qualifications, skills and industry experience have remained fairly standard for the last 20 years.

Currently in NSW Institutes of Technology a technical teacher (TAFE, 2003) is required to possess:

- ❑ A teacher qualification, minimum of a degree
- ❑ A qualification higher than that being taught
- ❑ 3 years current industry experience

A secondary high school teacher in NSW teaching within the VET in Schools program (NSW DET, 2003) is required to possess

- ❑ A teacher qualification, minimum of a degree
- ❑ A qualification equal or higher than that being taught
- ❑ 2 weeks current industry experience
- ❑ Certificate IV in Assessor and Training

In agreeing to provide National Training Packages to HSC students an optional examination is available to enable students to count the 2 units within the tertiary entrance score.

The difference in industry experience is quite dramatic and would severely limit the ability of the teacher to give sound advice about the likely occupational benefits of successful completion of skills training.

Instructional keyboarding texts

The following quotation from a Pitmans' College text originally published in 1946 continues to be valid in 2004 (Pitmans, 1966, 10).

Basis of Touch Typewriting

The basis of touch typewriting is that each finger operates only those keys allotted to it. Mental confusion and eyestrain are avoided, as the fingers are properly trained to respond accurately by the sight of a word or words to be typed. The fact that the fingers move instinctively in correct order for the production of words or groups of words is due entirely to methodical practice.

There are a variety of texts available and the research has published in this field. Each text provides direction and structure to the process of learning how to *touch keyboard*.

The researcher has published a text named “*Keyboarding Plus*” (Alderman, 2002). An example of one of the exercises is shown in Appendix E. The aim of this text is to introduce learners to *touch keyboarding* through reading and keying in words and phrases. There is a deliberate change from the manner that keys are introduced in other texts, in order to minimise repetitive nonsense letter drills and move quickly to words and phrases.

An earlier version of this text (Alderman, 1996) was successfully trialled on Years 4, 5 and 6 students at a local primary school in 1996. This study formed a major component of an action research study (NSW DET, 1996).

Analysis of Keyboarding Student Texts (Appendix F) indicates the different sections included in each text. As shown there are common threads throughout the texts even though the texts are written over a period of 40 plus years.

Analysis of Keyboarding Teacher Texts (Appendix G) also indicates the teaching and learning principles included in the text. As shown, each text covers the same components as the other, albeit in different depth and over a period of about 50 years.

Learning how to touch keyboard - the human element

In Australia, there is an identified **resistance to change**. This is specified within a Handbook published by Standards Association of Australia. The Ergonomic Handbook (Standards, 1994, 4) states:

“Resistance to Change

When a work force has performed a duty or task in a similar way for many years, a strong element of conservation is often found in that workforce. This conservation will most frequently be seen among those employees who have performed the task for the longest period and reflects a scepticism, lack of confidence in or even mistrust of new work practices or technologies which are to be introduced into an organisation. These users of the new system will remain sceptical until they have developed a confidence in their ability to work and interact with the new system, despite the technical or quality improvements obvious with new processes. The ultimate success or failure of a new process or work practice may well depend more on the way in which the change is introduced rather than the merits of the change itself.”

The above factors affecting a workforce’s resistance to change are supported in many ways where changing from “hunt and peck” to touch keyboarding.

- ❑ Unwillingness to change
- ❑ Lack of confidence
- ❑ Scepticism in the benefits
- ❑ History of failed attempts
- ❑ Willingness to learn overshadowed by a looming examination/publication deadline

- ❑ Little financial, educational or community encouragement to change
- ❑ Knowledge/need/skill prerequisite

As mentioned previously, as an administrative employee of an educational institution (NCAE) using a typewriter, efficient keyboarding skills were recognised as an employment prerequisite (35 wpm).

Within the experience of the researcher employed as a lecturer and tutor for enrolled students, there is no *touch keyboarding* prerequisites specified. And yet, the production of this and every other thesis requires computer access and keying in data and text all via a keyboard.

When employed in late 2003 as a Curricula Development Coordinator, this general position within the UoN carries an expected keyboarding workload definition of 2 hours per day. In reality lecturer, tutor and general positions all require keyboarding in order to meet the requirements of the position.

Negative transfer when changing methods of keyboarding

As stated by author McNicol (1968) there is a ‘negative transfer’ affecting a persons ability to change from one method of keyboarding to another.

For any person who has used “*hunt and peck*” as a method of keyboarding for a few years, the ‘resistance to change’ and ‘negative transfer’ directly impedes the acquisition of *touch keyboarding*. This will result in additional time required for skill acquisition, some remedial support and for some students the skill acquisition will be only partially successful.

Time factor within the classroom

One of the barriers to computer literacy, within an educational setting, is that educators are continuously caught up in teaching new components which leaves them with little time to move towards utilising computer literacy in a more reflective, evaluative and analytical way. This reflects my personal experience and is often heard in discussions at conferences, workshops and when exchanging experiences with practicing teachers.

Many educators select a “just-in-time” style in teaching basic skills and others choose to dedicate special classes to the acquisition of basic computing skill set. One university may choose a core computing subject and another may link the basic computing skills within other subjects. It is the learning styles of the educators, the goals of the institution and the resources available which influence how and when basic computing skills are acquired. What is important is that the skills are acquired. Educators in particular would need to investigate a whole of school change for students to be able to move between classes, teachers and departments.

Students and educators are often required to access technology using different computer laboratories, computers, platforms (MAC/IBM PC, Unix), platform or software versions, educators and styles of keyboards.

Whereas within an office environment, where an employee would be confident of access to one computer, within the education environment, students and educators need to be versatile and able to operate and teach/learn in a changing environment. This may be character building but does not improve efficiency, just versatility.

Difficulties arising from this may include:

- ❑ Moving between MAC and IBM PC environment requires different file management, screen layout, toolbars and mouse action
- ❑ Computer laboratories may not be set up in an identical manner which can lead to confusion or take up time to reestablish familiarity
- ❑ Keyboard styles and feel while generally the same, may differ from a personal keyboard and changing will take time to reestablish familiarity and confidence

Variable environment and student movement add additional complexity to the classroom dynamics.

Ergonomic factors in early childhood

Within the school environment, there is one group of students who are at a distinct disadvantage in terms of using a computer keyboard manufactured to adult specifications. That group is students in Kindergarten, Year 1 and Year 2.

Within Early Childhood classes, students are physically disadvantaged when using a standard computer keyboard. As discussed in the Australian Standards for Keyboard Layout earlier in this chapter, manufacturers are required to meet minimum size requirements. These requirements are designed to meet adult measurements. A further difficulty is that the keys are marked in capital letters. This also may cause difficulties for Early Childhood students when they are beginning to learn how to read.

The literature review did not focus on the issue of computer keyboards within the early childhood environment and for that reason, the place of computer keyboards in Early Childhood remains an unresolved issue within this thesis.

Reading required in acquiring touch keyboarding

In the literature available on teaching *touch keyboarding* the student is generally assumed to be an adult. Where ICT is to be integrated throughout the curricula from Kindergarten to tertiary, there is a second group who may be disadvantaged. This group comprises the students who are pre-literacy or remedial literacy, those who have yet to learn how to read and those who find literacy challenging.

The majority of *touch keyboarding* texts and computer aided instruction (CAI) require students to read, copy drills, exercises and instructions. This requires reading and therein creates a disadvantage in comparison to those older.

Support mechanisms to assist students at risk

There is a benefit from including “computer literacy” within the idea of “literacy”. Library of Congress (2002) definition of “literacy” as a subject heading is “ *the ability to read and write, often in relation to the expected norm for a particular group or culture*”. If computer literacy is an expected norm for a particular group then our understanding of how to support students who are “at risk” is aligned with how students are currently supported in the general respect to literacy.

Each institution has in place a range of procedures to recognise, address and improve literacy within their students’ body. If these mechanisms were extended to incorporate computer literacy this could alleviate the problem arising from everyone teaching the basic skills. For example testing basic computing skills at several checkpoints, by modeling the skills level expected of the student group, by providing support training to improve these skills are a few strategies worthy of investigation.

Students who find it difficult to use a computer keyboard may be doubly disadvantaged. Firstly in comparison to their peers they may be disadvantaged by time resulting in missed learning opportunities due to low skill level. Secondly, where an expected skill is clearly identified and assessed, a student at risk may then have an opportunity of accessing support mechanisms to assist and improve their skill. At the moment, the skill is not clearly identified as an expectation.

Skill development vs. core skills

Meredyth et al (1999), found that the focus was “to develop in students skills of information processing and computing”. This was a national research study aimed at providing a baseline reference.

Is *touch keyboarding* a basic computer skill? Meredyth et al (1999) identified 13 core basic skills and 13 advanced skills. The skill of greatest relevance is “use a computer keyboard”. Unfortunately, this study shows no range of sub-skills underlying this and it is impossible to identify *touch keyboarding* as one of these

Within the study the researchers developed the following 13 core skills. The list indicates the results of students' and teachers' basic computer skills as defined by Meredyth et al.

- | | |
|---|--|
| ☐ Use a mouse | ☐ Start a programme |
| ☐ Turn on a computer | ☐ Open a saved document |
| ☐ Use a keyboard | ☐ Delete files |
| ☐ Shut down and turn off | ☐ Get data from floppy disk or CD-ROM |
| ☐ Exit/quit a program | ☐ Create a new document |
| ☐ Save a document | ☐ Move files |
| ☐ Print a document | |

The 13 core skills – 12 have limited potential for development. For example a mouse has 3 moving parts, 2 buttons and a roller wheel. Once the moving, selecting, dragging and clicking actions are mastered there is little opportunity for further skill development. Equally, starting a computer has a limited potential for further development.

Similarly there are finite depths of skills associated with all other 11 core skills. “Use a computer keyboard” is the exception within this group. It is possible to move from novice to expert or to use the DET terminology to move from “keyboard familiarity” to “*touch keyboarding*”.

For the purposes of the above study there is an inference that any form of keyboarding is identified as a basic skill or alternatively the study may imply that *touch keyboarding* has no place in the modern world. It does indicate that a basic computer skill and advanced core skills are focused on applications not the skills of the teacher.

The researchers developed a further 13 more advanced skills. The following list indicates the results of teachers' advanced computer skills as defined by Meredyth et al (1999).

- | | |
|--|---|
| ☐ Play games | ☐ Send Email |
| ☐ Copy games from
CD+Rom/WWW | ☐ Use spreadsheets/databases |
| ☐ Creative writing | ☐ Create multimedia presentation |
| ☐ Use virus software | ☐ Search WWW |
| ☐ Create music/sound | ☐ Make web site/home page |
| ☐ Draw using a mouse | ☐ Use AWWW |
| | ☐ Create program |

There is no *touch keyboarding* in the advanced skills for teachers.

The concern is that a significant national research project failed to acknowledge the skill development that is clearly evident through earlier vocational recognition and grouped a skill involving over 150 keystroke combinations as a basic skill alongside a single step task like “turn on a computer”. For example 26 letters of the alphabet, 10 numbers, 11 punctuation keys, with all 46 having other values when pressed in combination with the special keys (shift, alt, control) and further value when combining two special keys together (shift+alt, shift+control).

The question of acquisition

When investigating *touch keyboarding* there is a new question raised in the 21st Century. “WHY?” Why learn to *touch keyboard*? The vocational logic of the 20th Century is displaced by the easy access of keyboards from kindergarten to tertiary and the software support for inaccurate data entry.

Students and teachers can teach themselves keyboard familiarity simply through trial and error. When learning to play a tune on a piano, a perfect, error free melodic, musical piece is an outcome each pianist may aspire to.

When using a word processor, application support provides spell check, grammar check, auto correct, backspace, delete, overtyping and insert. This support allows computer users to achieve an outcome of an accurate sentence, paragraph or document of text. Error free data entry may appear to be unnecessary when corrective measures are available.

Perhaps the question has more depth when the aspirations or goals become more involved. Simply to create accurate text is achievable with keyboard familiarity. In many cases, possessing the skill level of keyboard familiarity can be a source of additional stress and loss of confidence when a computer user is:

- ❑ Unable to meet time limitations
- ❑ Cause errors through pressing key combinations that activate unwanted application functions
- ❑ Diversion of concentration from content to process
- ❑ Exposure to RSI or health risks
- ❑ Inaccurate text where corrective measures are unavailable
- ❑ Lack of confidence in personal ability

Back to the question of - why? If the desired outcome is to create a sentence, paragraph or document of accurate text, then the keyboard familiarity as a skill level is adequate. Increase the expectation of the outcome to writing or publication tool and *touch keyboarding* as a skill level will be more appropriate.

Summary of Literature Review

The literature review enlightened the researcher to a range of relevant and unforeseen areas related to this thesis.

Internationally

- ❑ The literature highlights the importance of *touch keyboarding* as a skill during the 20th Century. However, there is little indication that *touch keyboarding* is viewed as important, or even considered worthy of noting in the last decade.
- ❑ The curricula documents in the 21st Century in USA connect touch keyboarding and developing composition skills at a keyboard.
- ❑ Early research by Haefner (1932) and Wood and Freeman (1932) recommended the ability of students in primary and secondary schools to acquire *touch keyboarding* skills and supported inclusion in primary years together with an educational aid to assist learning in other subjects.
- ❑ Current text (Gamble and Easingwood, 2000) place keyboarding as an incremental step for implementing a technology-rich classroom.

- ❑ *Touch keyboarding* forms a core component of primary, secondary and business services curricula with mandatory testing and appropriate levels of difficulty.

Australia

- ❑ Prerequisite and core modules were removed from the National Training Package for Business Services in 1998 and *touch keyboarding* changed from a core component in the package to an elective component as required for inclusion by an assessor.

New South Wales, Australia

- ❑ There are no current mandatory assessment requirements for students at any level, in any educational institution, to acquire, or be examined on *touch keyboarding* skills.
- ❑ *Touch keyboarding* is not included in the NSW Department of Education and Training K-12 curricula.
- ❑ Keyboard familiarity is a component of the NSW Department of Education and Training K-12 curricula and forms part of the mandatory assessment in Year 6 and Year 10.
- ❑ There are no departmental, commercial or professional requirements for preservice or practicing teachers to acquire *touch keyboarding* skills.
- ❑ The qualifications for teachers/assessors delivering National Training Packages in Business Services are markedly different in relation to industry qualifications and experience, for technical institutions, secondary schools and on-the-job.

Through experience and through exploration of the literature, the researcher is aware of the pressure placed on educators to provide a rich learning environment for students to develop, learn and succeed, within a finite time period.

As a technology educator, the researcher is well aware of the amount of time wasted within the classroom when students are unfamiliar or slow at entering data into a computer. Conversely, when working with students with good *touch keyboarding* skills software development and creative application of technology can be enhanced.

The literature review has revealed that New South Wales curricula have moved away from vocational *touch keyboarding* and have not formally introduced *touch keyboarding*

into the primary and secondary education sectors. This is not reflected in the international texts nor in the international curricula.

There are several unexplored factors that will allow a deeper understanding of the issue of teaching and learning *touch keyboarding*. What is happening within educational institutions that may not be reflected within the literature?

CHAPTER THREE: METHODOLOGY

This chapter will detail the research methodology, research tools, planning, data compilation and report writing within this research project.

Research Design

The research plan involved describing the current practice in teaching and learning *touch keyboarding* with supporting evidence from two perspectives: a literature review to identify the rhetoric surrounding the topic and a descriptive research of current practice within educational sectors.

This research plan involves a qualitative research design in order to look at the larger picture and view the issues in a holistic manner (Denzin & Lincoln, 1994). This design demands that the researcher stay in the setting throughout the time period and incorporates room for description of the researcher's own experience and beliefs.

Descriptive study was selected as the appropriate research strategy with the structured interview as the method of collecting data where the researcher asked each respondent a series of pre-established questions (Denzin & Lincoln, 1994, Cohen & Manion, 1994).

A second source of data is through observation and note taking with regard to the posture of participants (Denzin & Lincoln, 1994). In order to offer a balance to the research through triangulation, a third source of data is through the qualitative research design to measure the ability of participants in *touch keyboarding*. This will allow the research to test the hypothesis "can participants learn to touch keyboard?" and investigate causal relationships, perhaps attendance analysed against outcomes (Neuman, 1997).

Structured Interview

Within the descriptive study, the interview recognises checklists, questionnaires and interview guides as data collection devices. When looking at collection devices, Cohen and Manion (1994) describe structured interviews as valuable research instruments in a number of ways. The researcher investigated the structured interview as a method of collecting data.

Firstly, a structured interview gathers data at a particular point in time. The intention is to describe the nature of existing conditions. Secondly, a structured interview is also able to identify standards and compare conditions. Thirdly, a structured interview can determine the relationship existing between specific events. In this thesis describing the nature of existing conditions is valuable and relevant to the pursuit of the primary objectives. The application of the structured interview is by way of a structured interview with pre-planned questions.

Question planning for interview

The primary objectives, to explore the questions “is touch keyboard being learned within the educational institutions and the subsidiary topics, is learning to *touch keyboarding* important, what skills do the educators possess and do students and educators use a computer keyboard”, provide the initial framework for the development of the structured interview questions. The following figure provides the question planning process this researcher followed to prepare the structured interview questions to be asked during the structure interview.

The following flowchart outlines the steps undertaken to prepare the structured interview.

Stages in Planning the Interview

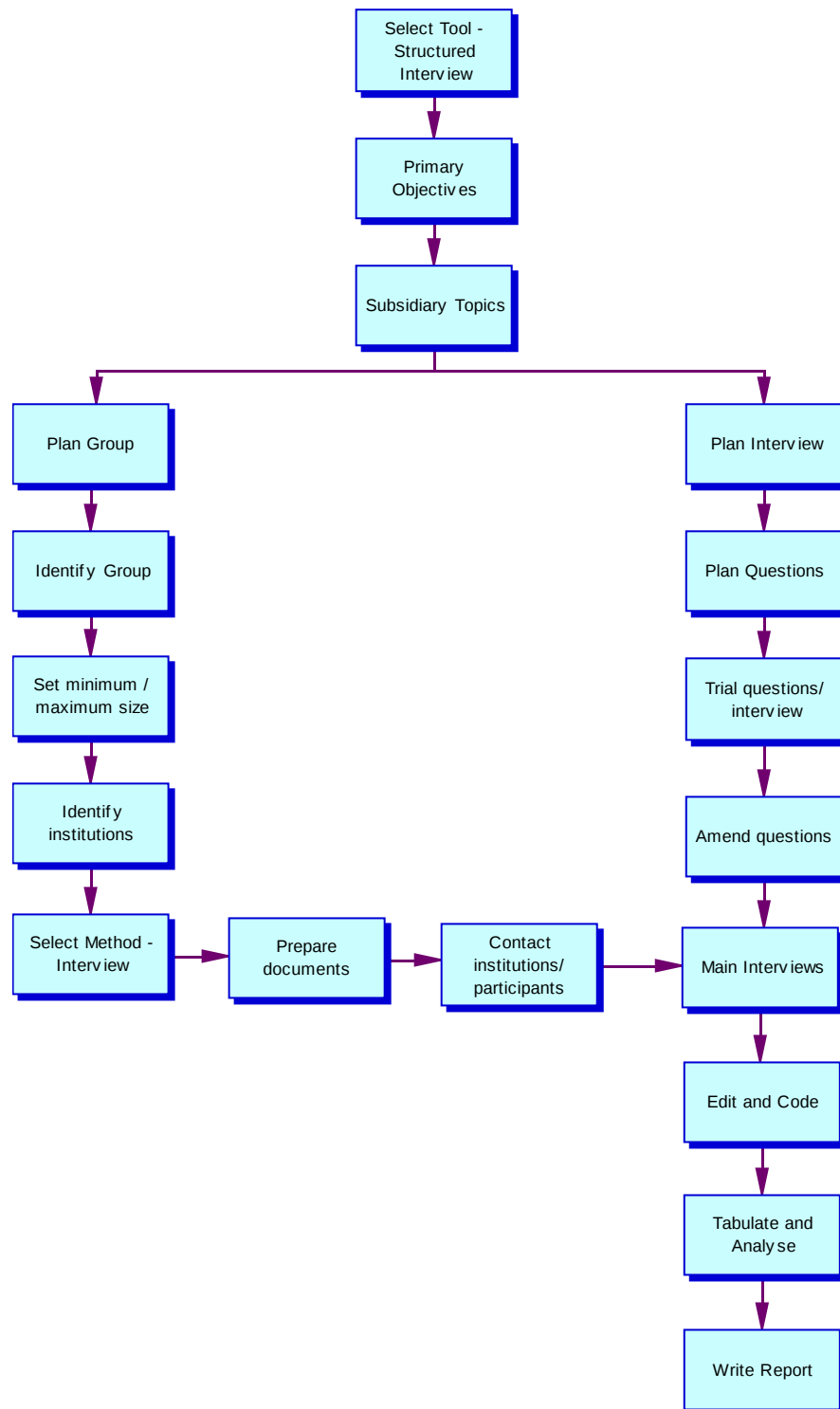


Figure 8 Stages in Planning Structured Interview adapted from Manion (1994, 84)

In designing a structured interview several components are important:

- ❑ Purpose of the enquiry or the primary objective
- ❑ Sample group
- ❑ Resources available

The primary objective of the structured interview is to describe the current status of teaching and learning *touch keyboarding* in education institutions in New South Wales, Australia. Within the primary objective, further subsidiary topics provide the broader aim of the enquiry. For example, the topic headings are questions relating to:

- ❑ Current practices in learning keyboarding in your institution
- ❑ Current practices in teaching keyboarding in education institutions
- ❑ *Touch keyboarding* and is it preferable to “*hunt and peck*” keyboarding
- ❑ Issues in teaching and learning *touch keyboarding*

Following exploration of the subsidiary topics additional detailed information required to meet the overall objectives was sought. Examples of subset of questions are:

- ❑ Current practices in teaching keyboarding in education institutions
 - Are you proficient at *touch keyboarding* and at what level?
 - How do teachers learn to teach keyboarding?
 - How much time do you spend on a computer keyboard each week?
 - In your institution, what support is available for teachers to improve their keyboarding skills?
 - In your institution, what resources are available for teachers to teach keyboarding skills?
 - Please indicate the type of keyboard work you are expected to perform in relation to your teaching?

It is important to ask questions that gather evidence to compare and analyse against the literature review. Handwriting is a basic writing tool and within the literature, keyboarding is considered a basic writing tool. The purpose of enquiring about handwriting and *touch keyboarding* is to provide an opportunity to collect data on the beliefs and knowledge of educators that can be compared with the evidence within the literature.

For example:

- ❑ In your institution, what support is available for students to improve their hand writing skills?

See the Structured Interview Question Schedule in Appendix H.

Stratified sampling

Best and Kahn (1993) consider that when the overall group comprises practicing educators within the state of New South Wales a representation of the group is appropriate. Interviewing the whole group is unnecessary when a sample from identified subgroups, a stratified sample, will provide an appropriate sample group.

In order to achieve a balance between educational sectors, educators (teachers/lecturers) from primary, secondary and tertiary were selected. Within the tertiary institution the school offering courses for preservice teachers was identified as continuing the relationship of lecturer/teacher/student with the tertiary students enrolled as preservice teachers. This provides valuable information for the context of teacher training.

The researcher considered sampling of the technical education sector unnecessary as the status of *touch keyboarding* practice within this sector is governed under a national curricula framework clearly identifiable through literature review and with a history of vocational acceptance of the skill. In the researcher's experience the other educational sectors were of greater interest as broad spread introduction of technology has impacted directly on the classroom management, teaching and learning.

Sample size

A sample size of 30 educators, ten educators from each sub group were invited to participate in the research project. As stated in Cohen and Manion (1994) and supported by Booth, Colomb and Williams (2003), a sample size of 30 is a manageable number held to be reasonable. Of the four subgroups identified, primary, secondary and tertiary were included in the sample and three institutions were invited to participate. A sample size of 10 per institution was considered reasonable with a number of five per institution established as a minimum goal for the researcher.

Sample group and sub groups

In order to arrive at a generalisation of results the sample group will need to be a group of individuals who have one or more characteristics in common (Best and Kahn, 1993). The common characteristics in the sample group are – the participants are practicing educators from institutions within the Hunter Region, New South Wales, Australia.

Denzin and Lincoln (1994) recommends that for structured interviews, in this case in the form of a structure interview, representative sampling is preferable to random sampling, as long as each sub group is represented and as the design purpose was to describe the status quo, representative sampling would allow an appropriate result.

The sample group focus is on inservice educators with the term educators including primary, secondary and tertiary teachers from the Newcastle district. The Newcastle districts offer an opportunity to interview educators from a primary system that feeds into the secondary which then feeds into the tertiary institution. The tertiary institution preservice teacher program then supplies teachers to the primary and secondary institutions. This is shown in the figure below.

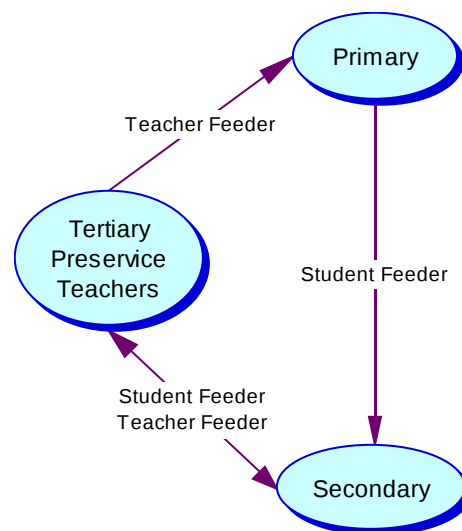


Figure 9 Sociogram identifying relationships between institutions

Primary School – feeder school to high school

Originally two primary schools were invited to participate in the study, the school outlined below and a second school that was a feeder into the secondary school and one that the researcher had no previous dealings.

The timing of the ethics approval to conduct the research fell within the first term of a school year and came at a very busy organisational period for each school. Approaching schools during this time coincided with several compulsory surveys to be completed by the schools and resulted in delays and in the case of the first primary school declining to take part in the project.

The second primary school approached had participated in a Key Group Action Research Study in 1996 where the researcher introduced the keyboarding program and established the protocol for the program to continue. Some teachers continue to include the keyboarding program as part of classroom practice. The principal agreed to participate in the project.

High School – feeder school to University

As reported in the first chapter, there is a national goal to embed ICT within the curricula of all educational sectors in Australia. At school level this translates into high school teachers are being asked to integrate Information and Communication Technologies (ICT) into all curricula areas. Teachers within different disciplines are at different stages of implementing embedded ICT across all curricula areas. The Principal agreed to participate in the project. As the secondary school was introducing a computer subject in Stage 4, interviewing teachers from this school may offer different views from those expressed within the literature.

School of Education – trainer of preservice teachers

School of Education lecturers are currently engaged in a discourse on the integration of ICT within the teaching and learning components of courses within the school. The Dean of the School agreed to participate in the project.

Research documentation

The following list indicates the types of letters and documents prepared to invite institutions, teachers and lecturers to participate in this research study. All documents were approved by the University Ethics Committee and document the version number and details of the researchers. (See examples in Appendix I.)

- ❑ Invitation to institutions to participate
- ❑ Information statement for the school/university invited to participate
- ❑ Information statement for the teacher/lecturer invited to participate
- ❑ Consent Forms

Testing of Touch keyboarding Skills

Industry and vocationally recognised, Australian Standard AS 2708-2001 (Council, 2001) testing is available to measure the *touch keyboarding* speed and accuracy of learners. The researcher included the posture diagram and the frequency diagram as tools to enable a more complete picture to be drawn between *touch keyboarding* and “*hunt and peck*” method.

Test group

Students from bridging courses conducted by the researcher during scheduled classes participated in pre and post testing, under AS 2708-2001, to assist in gauging their progress in the acquisition of *touch keyboarding* skill. See Appendix G for the outline of the bridging course.

Two test groups were assessed by pre and post testing of *touch keyboarding* with speed and accuracy under AS 2708-2001. In Group 1, 16 students completed the course and Group 2, 4 students completed the course.

Testing

- ❑ A Record of Student Attendance (Appendix K) and session duration were recorded to eliminate skewed results from the differences that attendance has upon outcomes
- ❑ Pre-test – students sat for a five minute speed and accuracy test under Australian Standard AS 2708, before starting the Bridging Course
- ❑ Post-test – students sat for a five minute speed and accuracy test under Australian Standard AS 2708, after completing the Bridging Course

Correctness of posture

Observation sheets were used to record the posture of students both before and after completing the Bridging Course. The arm, shoulder, back, head and leg positions were recorded to identify how the students were sitting when using a computer keyboard.

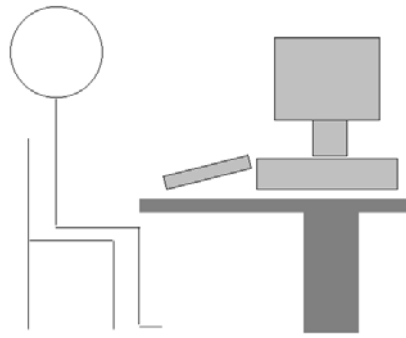


Figure 10 Posture diagram

Observation Sheet – see frequency diagram in Appendix L.

Assessing the workstation through the checklist

The Princeton University Computer Workstation Checklist (2002) provided an instrument for the evaluation of ergonomic adjustments for human use of a computer workstation

A. body Position	Y	N	NA	Comments
1 Head is directly over shoulders				
2 Shoulders are relaxed				
3 Elbows are at 90° angle resting comfortably at side		<i>Sample only see Appendix M for the full checklist.</i>		
4 Wrists are straight, floating over wrist rest				
5 Knees are at 90° angle or greater				
6 Feet flat on floor or supported by footrest				

Figure 11 Computer Workstation Checklist

See the full checklist in Appendix M.

Frequency diagram

The Frequency Diagram required the researcher to indicate head movement over a two minute period. A second requirement was to indicate whether the head movement was towards the keyboard, the screen or the text. This information was recorded during the 5 minute speed and accuracy test before the Bridging Course started.

Through experience in teaching computing and *touch keyboarding*, the researcher observed very little head movement in a person who can *touch keyboard*. A person who uses the “*hunt and peck*” method of keyboarding relies upon sight and therefore there is an increased amount of head movement between the keyboard, screen and text.

Frequency diagram to record head movement of students during testing delivery of *touch keyboarding* Course

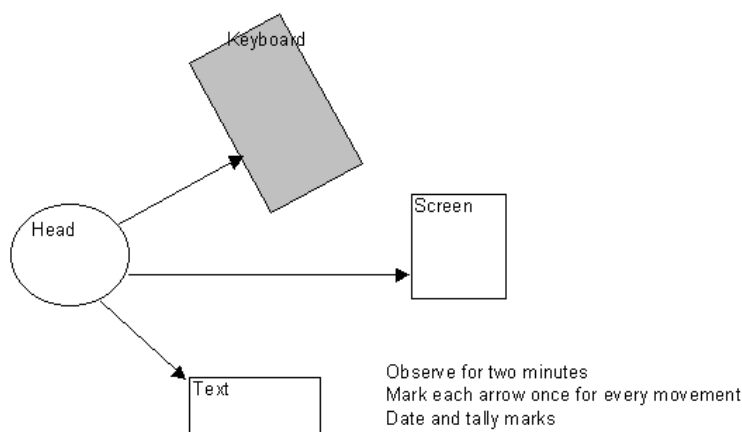


Figure 12 Frequency Diagram

See Appendix L for the Research Tool.

In this situation, it was very difficult for one observer to mark down the rapid head movements of a “*hunt and peck*” keyboarder. The frequency was very high and trying to differentiate accurately between the different types of movement became impossible. Several attempts were made, however although the accuracy of the recording is questionable but the number of movements are quite typical.

University Access Program – feeder program to University

Students in the current computer bridging summer school, enrol in “*an introduction to computing course*” and learn how to *touch keyboard*. These students are seeking assistance and new skills and are already aware of the need to acquire them. Participation is part of their curricula within the bridging course.

As this researcher has been the lecturer of such bridging computer courses, data and observations have been collected from a group in 2003 and 2004. This formed part of the normal teaching practice and the years selected fell within the researcher’s enrolment for this thesis.

Data Compilation

In order to compile the structured interview data in a suitable format, a Microsoft Access database was designed. This allowed data to be entered into a form with the same number layout as the Interview Questions. After entering all fifteen interviews, a report was compiled displaying each question with the relevant data as reported below. (See Appendix N.)

Before conducting the interviews, a trial interview was conducted to ascertain any early difficulties, to eliminate confusion and to offer an opportunity to look at the type, context and relevance of questions. In entering the data into the database two errors in number layout were noted. These errors went unnoticed till later, as the interviews were face-to-face, but, for future work trial data entry would be recommended as being of importance to ensure that the format was workable.

Conclusion

Several of the research tools selected are standard practice within the vocational community and these, together with structured interviews and newly developed research tools, form the basis of the research methodology within this thesis.

CHAPTER FOUR: RESULTS

Introduction

This chapter presents the results from the data gathering tools, the responses from the structured interview and scores from the test group.

Demographics of Respondents

Question 1 asked “Which institution and year do you currently teach?” The respondents interviewed represent teachers and lecturers in every stage of the curricula, from Early Stage 1 to Stage 7. The table below indicates the range of respondents with a broader coverage of Stages 4 to 6. This reflects the multiple years being taught within a calendar year in those stages.

Institution	K	1	2	3	4	5	6	7	8	9	10	11	12	T1	T2	T3	T4	TP
Primary				☒														
Primary					☒													
Primary					☒	☒												
Primary	☒																	
Primary					☒													
Secondary								☒	☒	☒	☒	☒						
Secondary									☒	☒	☒		☒					
Secondary								☒	☒	☒	☒	☒	☒					
Secondary								☒	☒			☒						
Secondary									☒									
Tertiary														☒				
Tertiary																		☒
Tertiary																☒	☒	☒
Tertiary														☒			☒	☒
Tertiary														☒			☒	

Legend: T=Tertiary, TP = Tertiary Postgraduate

Table 6 Respondents Current Teaching Responsibilities

Five teachers were interviewed from a primary and five from a secondary school, with a further five lecturers interviewed from a pre-service teaching school within a tertiary institution. A total of 15 teachers and lecturers were interviewed. The teachers and lecturers volunteered to participate in the research project.

Structured Interview

Use of computer keyboard for course related activities

Question 2 asked “Do your students use a computer keyboard for course related activities?” All students from Early Stage 1 to Stage 7 are required to use a computer keyboard for coursework related activities. There is a coursework requirement for all students from Early Stage 1 to Stage 7 to use a computer keyboard on a weekly basis.

Institution	Yes	No
Primary	☒	
Primary	☒	
Primary	☒	
Primary	☒	
Primary	☒	
Secondary	☒	
Secondary	☒	
Secondary	☒	
Secondary	☒	
Secondary	☒	
Tertiary	☒	
Tertiary	☒	
Tertiary	☒	
Tertiary	☒	
Tertiary	☒	

Table 7 Expectations of students with regard to course related activities

Finding #1: Respondents indicated that all students, enrolled in Kindergarten to Post Graduate study, are expected to use a computer keyboard as part of their coursework.

Time students spend on a computer keyboard

Question 3 was “What is the average amount of time your students spend on a computer keyboard each week?” Respondents indicated the amount of time students were expected to spend on a computer keyboard each week. The amount of time required of students differed markedly.

Institution	Minutes
Primary	90
Primary	30
Primary	60
Primary	30
Primary	30
Secondary	80
Secondary	60
Secondary	240
Secondary	40
Secondary	60
Tertiary	30
Tertiary	240
Tertiary	30
Tertiary	120
Tertiary	180

Table 8 Time Spent by students on a Computer Keyboard

The minimum amount of time required on a weekly basis was 30 minutes in primary with the maximum amount of time required being 240 minutes, or 4 hours, required in secondary and tertiary.

One third of students spend ½ hour, one third spend between 1 and 1 ½ hours and the remaining third spend between 2 and 4 hours per week on the computer keyboard.

The following table indicates the average amount of time primary, secondary and tertiary students spend on a computer keyboard each week in the different sectors.

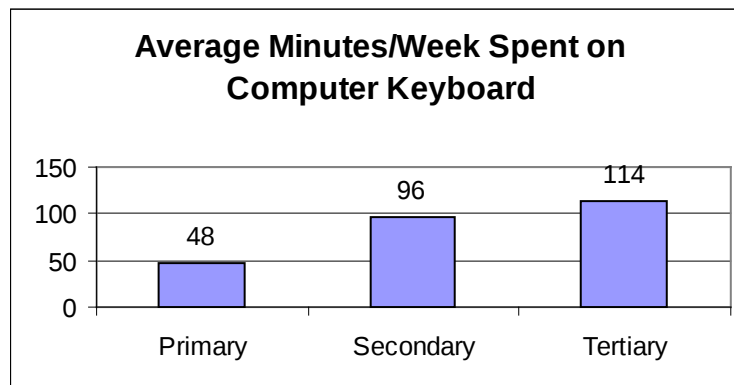


Table 9 Average Time Spent on Computer Keyboard by Sector

The average weekly amount of time required by students is 48 minutes in primary, 96 minutes (1 hour 16 minutes) in secondary and 114 minutes (1 hour 54 minutes) in tertiary.

Although the maximum requirements from a respondent in secondary and tertiary were the same 4 hours overall, on average the amount of time required doubles from primary to secondary, with a further increase in tertiary.

Finding #2: The amount of time students are expected to spend on a computer keyboard each week increases in accordance with the level of coursework.

Expectations of computer keyboard work by students

Question 4 asked “Please indicate the type of keyboard work your students are expected to perform in relation to your course?” Respondents listed the type of keyboard tasks their students are expected to perform in relation to the course together with their own expected keyboard tasks. Table 5.5 graphically represents the list of keyboard tasks students are asked to perform in their coursework.

Keyboarding Tasks	Primary					Secondary					Tertiary				
Word Processing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Internet/Library	✓		✓			✓		✓		✓	✓			✓	✓
Publishing		✓	✓			✓	✓		✓	✓					
Spreadsheets			✓			✓	✓	✓			✓				
Presentation			✓			✓			✓			✓			
Keyboarding	✓	✓			✓										
Database						✓	✓								
Online (Blackboard)												✓			✓
Subject specific software									✓		✓				

Table 10 Expectations of Computer Keyboard by Students

The keyboarding tasks in the table above are ranked in order of most expected being word processing, down to least expected, being database, online and subject specific software. Learning to keyboard is ranked 6th by all interviewees. This ranking is retained throughout all graphs illustrating information about student keyboarding tasks.

The range of keyboarding tasks required by students, in primary, secondary and tertiary to perform, is broad. All students are required to use the keyboarding for word processing tasks with the Internet and library tasks being the second highest use requirement for students.

The required keyboarding tasks for primary students indicate word processing as the highest. In primary all general tasks are required with no expectation of students to use online and subject specific software at primary level.

The required keyboarding tasks in secondary indicate a higher expectation in internet/library, publishing and spreadsheets. There is no expectation of students to use keyboarding and online by students at secondary level.

The required keyboarding tasks in tertiary are not as broad as within secondary. Online and subject specific software are required however there is no expectation of students to use publishing, *touch keyboarding* and database at tertiary level.

Respondents were asked to list the type of keyboard work students were expected to perform in relation to the course. It is noteworthy to acknowledge that web design is absent from all lists.

Finding #3: All students are expected to use word processing as part of their coursework.

Student proficiency at touch keyboarding

Question 5 asked “Are students in your institution proficient at *touch keyboarding* and at what level?” The table below indicates the keyboard proficiency of students enrolled in the respondents’ institutions. The respondents made this assessment through teaching experience and without the assistance of a formal testing process.

Institution	Yes	What Level?
Primary		Low
Primary		Low
Primary		Low
Primary		Low
Primary		Low
Secondary		High, medium and low
Secondary		High, medium and low
Secondary		Low
Secondary		Low
Secondary	☒	Medium
Tertiary		Low
Tertiary		Low
Tertiary		Low
Tertiary		Medium
Tertiary		Low

Table 11 Keyboard Proficiency of Students

87% of students across primary, secondary and tertiary institutions possess low, 27% possess medium and 13% possess high keyboard proficiency. When asked to indicate whether students enrolled in their institution were proficient at *touch keyboarding* only one respondent indicated yes. Two respondents indicated that students enrolled were of

low, medium and high proficiency levels. Two respondents indicated medium, with 13 respondents indicated low proficiency levels.

The table below indicates the keyboard proficiency of primary, secondary and tertiary students enrolled in the courses. The respondents made this assessment through teaching experience and without the assistance of a formal testing process and as a few identified both medium and high proficiency this is reflected in the total being over 100%.

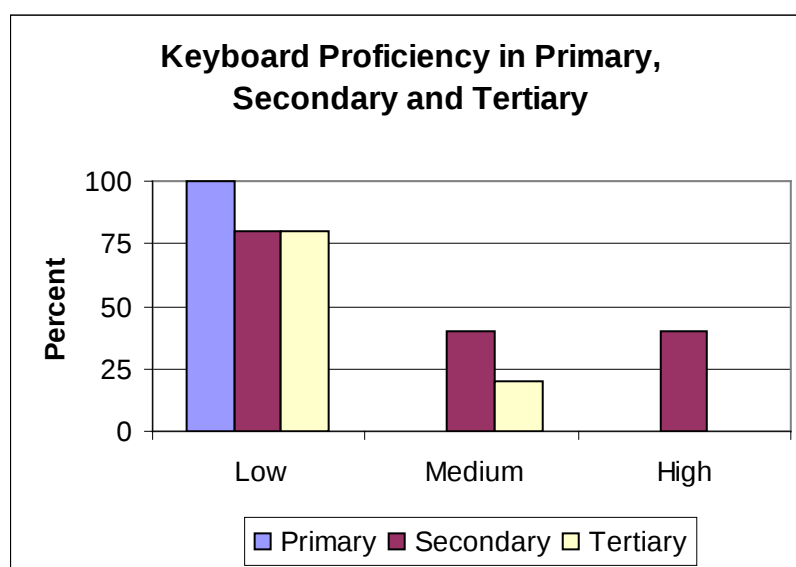


Table 12 Keyboard Proficiency of Students by Sector

100% of students in primary possess low keyboarding proficiency. The secondary students reflect a broader skill range, which will reflect the fact that three respondents indicated low, medium and high proficiency for their students. No tertiary students were indicated as possessing high keyboard proficiency.

Finding #4: The majority (87%) of students in this study possess low level of keyboarding proficiency.

Institution support for learning handwriting

Question 6 asked “In your institution, what support is available for students to improve their hand writing skills?” In primary, students wanting to improve their hand writing skills are supported by formal texts, lessons, teacher analysis, daily exercises, explanations and reassurance to build confidence. In secondary and tertiary there is no formal or informal support for students to improve their hand writing skills.

Institution	Support for handwriting – comments by respondents
Primary	Yes, lessons.
Primary	Teacher analysis, one to one, handwriting texts.
Primary	Class direction and one to one, practise, explanation in speed and shortcuts helps with confidence.
Primary	Teach handwriting daily, letter formation, hand activities, huge amount and formal tasks.
Primary	Teacher support and text support and role model.
Secondary	Not known
Secondary	Don't know.
Secondary	Nil
Secondary	None.
Secondary	No.
Tertiary	Nil, that I know of.
Tertiary	Is there any?
Tertiary	Not that I am aware of.
Tertiary	Nil.
Tertiary	None

Table 13 Institutional student support for learning handwriting

The table below clearly identifies handwriting in the primary curricula from Kindergarten to Year 6 translated from the individual respondents into sectors. There is no support for students wanting to improve their handwriting at secondary or tertiary level.

	Support	Primary	Secondary	Tertiary
Learn Handwriting	Class Tuition	✓ ✓ ✓ ✓ ✓		
	Handwriting Texts	✓ ✓ ✓ ✓ ✓		
	Acquire through use			
	Online Tuition			
	Self Tuition			
	External course			

Table 14 Institutional student support for learning handwriting by sector

Finding #5: Respondents were clear about how to learn handwriting and placed teaching responsibility within the primary sector.

Institution support for learning computer keyboarding skills

Question 7 asked” In your institution, what support is available for students to improve their keyboarding skills?” Students wanting to improve their keyboarding skills are

supported by formal texts, lessons, teacher analysis, daily exercises, explanations and reassurance to build confidence. Acquisition through use, online tuition, self-tuition and external courses are within the support offered to students.

Institution	Support for keyboarding – comments by respondents
Primary	Teacher support during lessons.
Primary	Class time, set of texts.
Primary	Keyboarding texts, computer technology policy, one to one, timings, fun no outcome other than enjoyment.
Primary	School keyboarding program, 10-15 minutes each lesson.
Primary	Practise in word processing.
Secondary	None, if not enrolled in a computer course. TAFE courses available if enrolled at TAFE.
Secondary	None.
Secondary	Nil, Year 8 computers only at present.
Secondary	Word processing and touch typing for six week. Year 8 technical course for two periods a week - basic computer skills.
Secondary	Text.
Tertiary	Online, self instruction program.
Tertiary	None that I could advise them of.
Tertiary	Not that I am aware of.
Tertiary	Library - touch typing texts and software.
Tertiary	None, themselves.

Table 15 Institution student support for learning keyboarding

Support in acquiring keyboarding skills is offered in a variety of formats from Early Stage 1 to Stage 7. This table, while clearly indicating the responsibility for teaching handwriting lies within the primary curricula, equally it reflects the current scattered or confused understanding of where the responsibility for teaching keyboarding lies across the whole curricula.

	Support	Primary	Secondary	Tertiary
Learn Keyboarding	Class Tuition	✓ ✓ ✓ ✓	✓	
	Keyboarding Texts	✓ ✓ ✓	✓ ✓	
	Acquire through use	✓		
	Online Tuition			✓ ✓
	Self Tuition			✓

	External course		✓	
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Table 16 Respondents View on Learning Keyboarding by sector

Support in learning how to teach keyboarding skills is largely unknown to the respondents with only one response each for classroom tuition, online, self tuition and an external course.

Finding #6: Respondents were unclear about how to learn *touch keyboarding* and where the teaching responsibility should lie.

When to introduce computer keyboarding

Question 8 asked “When do you feel keyboarding should be introduced to students?” Respondents indicated one or more educational sectors.

Institution	When to introduce keyboarding?
Primary	Primary
Primary	Primary
Primary	Primary
Primary	Primary
Primary	Secondary
Secondary	Primary
Secondary	Primary
Secondary	Primary and secondary
Secondary	Primary and secondary
Secondary	Primary and secondary
Tertiary	Primary
Tertiary	Primary and Secondary
Tertiary	Primary
Tertiary	Primary
Tertiary	Primary

Table 17 When to introduce computer keyboarding

Respondents were asked to identify one or more years during which keyboarding could be introduced. Respondents indicated a year or a range of years as indicated in the table below.

Institution	K	1	2	3	4	5	6	7	8	9	10	11	12	T1	T2	T3	T4
Primary	☒	☒	☒	☒	☒	☒	☒										
Primary	☒	☒	☒	☒	☒	☒	☒										
Primary	☒	☒	☒	☒	☒	☒	☒										
Primary				☒													
Primary											☒	☒	☒				
Secondary	☒																
Secondary				☒													
Secondary					☒	☒	☒	☒	☒								
Secondary				☒	☒	☒	☒	☒	☒	☒	☒	☒	☒				
Secondary						☒	☒	☒	☒								
Tertiary				☒	☒	☒	☒										
Tertiary				☒	☒	☒	☒	☒	☒	☒	☒						
Tertiary	☒	☒	☒														
Tertiary					☒												
Tertiary						☒	☒										

Table 18 When to introduce students to keyboarding

The following table classifies the responses into stages and identifies Early Stage 1 to Stage 6 were indicated, with Stage 2 and 3 being the preferred areas for the introduction of keyboarding. Early Stage 1 covers Kindergarten, Stage 1 covers Year 1 and 2, Stage 2 covers Year 3 and 4, Stage 3 covers Year 5 and 6, Stage 4 covers Year 7 and 8, Stage 5 covers Year 9 and 10, Stage 6 covers Year 11 and 12 and Stage 7 covers Tertiary Year 1 to Postgraduate.

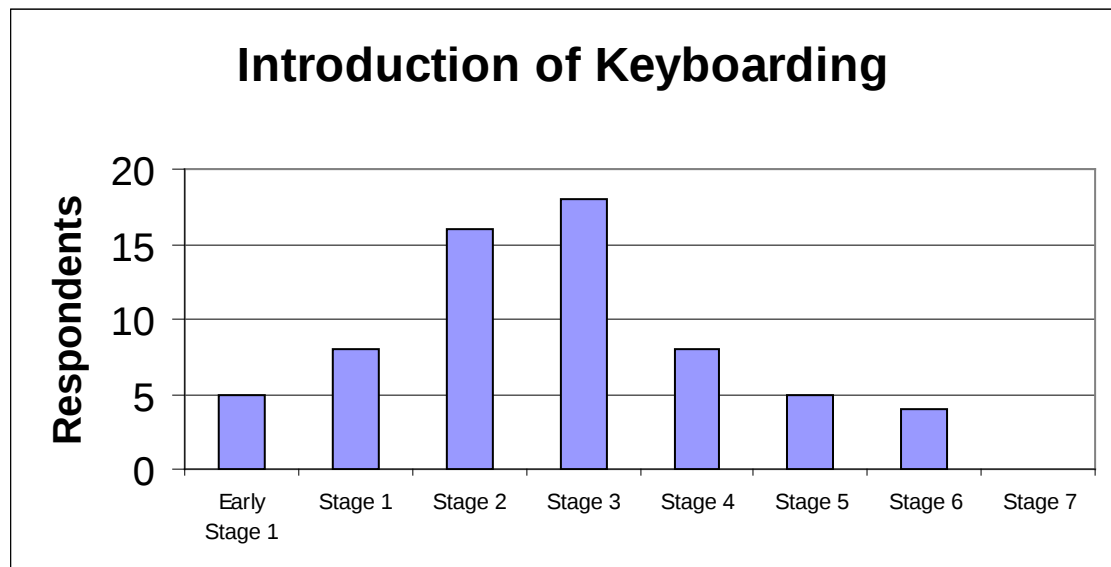


Table 19 When to introduce students to keyboarding by Stages

Finding #7: Respondents held mixed views on when computer keyboarding should be introduced, however, there was a trend towards Stage 2 and Stage 3.

Teacher proficiency in touch keyboarding

Question 9 asked “Are you proficient at *touch keyboarding* and at what level?”

Respondents responses are in the table below indicating the keyboard proficiency of respondents in a primary, secondary and tertiary institution. The respondents made a self-assessment without the assistance of a formal testing process.

Institution	Yes	No	Level
Primary		☒	Medium
Primary	☒		Medium
Primary	☒		Medium
Primary		☒	Medium
Primary		☒	Low
Secondary	☒		Medium
Secondary		☒	Low
Secondary		☒	Low
Secondary		☒	Low
Secondary	☒		High
Tertiary	☒		High
Tertiary		☒	Low
Tertiary		☒	Low
Tertiary		☒	Low
Tertiary		☒	Low

Table 20 Teacher proficiency in *touch keyboarding*

53% of respondents possess low, 33% possess medium and 15% possess high keyboard proficiency.

The following table displays the keyboard proficiency of primary and secondary and tertiary respondents the percentage of responses by sector.

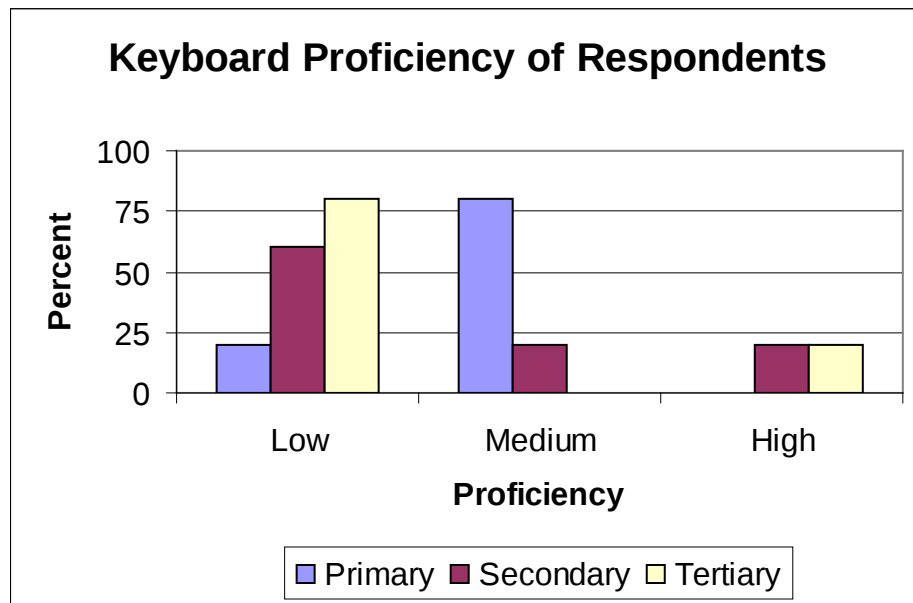


Table 21 Keyboard Proficiency of Respondents by Sector

The majority of respondents possess low to medium *touch keyboarding* proficiency. 80% of tertiary possess low with the remaining 20% with high proficiency.

Finding #8: Half (53%) the respondents possess low level of keyboarding proficiency with this group dominated by the tertiary sector (80%).

How teachers learn to teach keyboarding

Question 9a asked “How do teachers learn how to teach keyboarding?” Respondents gave mixed views as detailed in the table below.

Institution	How do teachers learn how to teach keyboarding?
Primary	Don't know, passing on own skills.
Primary	Through personal knowledge and texts.
Primary	Particular program for students and teachers and reinvented for students. Watch and learn techniques TAFE secretarial texts.
Primary	No formal teaching - not from a program.
Primary	Using specific programs.
Secondary	Self-taught – inservice.
Secondary	Teach themselves if we have time.
Secondary	Self taught.
Secondary	We don't.
Secondary	Self.
Tertiary	Mostly by self instruction or non compulsory program.
Tertiary	No idea.
Tertiary	Not aware of it here, at TAFE yes.
Tertiary	No idea, an expectation using software to learn.
Tertiary	Colleagues and keyboarding course, self taught or hunt and peck.

Table 22 How teacher learn *touch keyboarding*

Finding #9: The majority (93%) of the respondents identified self-tuition, external programs or were unaware of how teachers learn how to *touch keyboarding* and only one (7%) identified “in-service”.

Average computer keyboard time for teachers

Question 10 asked “How much time do you spend on a computer keyboard each week?”

The following table indicates the average weekly time spent keyboarding by respondents. Primary and secondary respondents spend a similar amount of time, however, the tertiary respondents spend nearly five times more time keyboarding.

Institution	Time Spent on Keyboard
Primary	420
Primary	90
Primary	540
Primary	240
Primary	240
Secondary	150
Secondary	120
Secondary	0
Secondary	1200
Secondary	840
Tertiary	3000
Tertiary	900
Tertiary	600
Tertiary	2100
Tertiary	1200

Table 23 Amount of time respondents spend on a keyboard each week

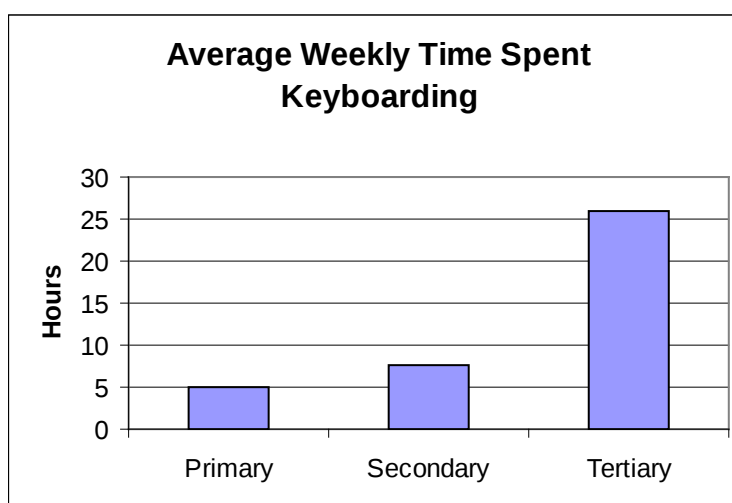


Table 24 Average Time Respondents spend on computer keyboard by sector

The average weekly amount of time spent on a keyboard increases from primary to secondary, however the time in tertiary is more than 3 times that of secondary. This is of significance to the tertiary sector.

Finding #10: On average, all respondents spend a minimum of 5 hours per week on a computer keyboard with the tertiary sector spending 26 hours per week at a computer keyboard.

Institutional support for teachers learning computer keyboarding

Question 11 asked “In your institution, what support is available for teachers to improve their keyboarding skills?” The table below details the support available for teachers at the institution of each respondent and reflects respondents views that there is little support.

Institution	Support available for teachers
Primary	Very little.
Primary	Nothing.
Primary	Possible purchasing requirements/support of computer coordinator. Good relationship with computer company/colleagues, TILT and TILT+ (NSW DET Training Directorate, 2002).
Primary	None.
Primary	Nil - technical support not keyboarding.
Secondary	TAFE – inservice.
Secondary	None.
Secondary	Only when needed eg. Assessment task year 11 and 12.
Secondary	Tilt, Tilt+, CD, not particular keyboard course.
Secondary	None.
Tertiary	Self instruction.
Tertiary	Don't know - none that I am aware of.
Tertiary	Not aware of any.
Tertiary	Nothing - software.
Tertiary	None.

Table 25 Institutional support available for teaching keyboarding

Finding #11: There appears to be little support or a low awareness of the support available to teachers to improve their *touch keyboarding* skills.

Institutional resources for teaching computer keyboarding

Question 12 asked “In your institution, what resources are available for teachers to teach keyboarding skills?” The following table indicates the type of resources available for teachers to assist them in the teaching of keyboarding.

Institution	Resources available for teachers
Primary	Keyboard program- basic skills.
Primary	Keyboarding text, not sure of others.
Primary	Class and teacher oriented, not sure there is one within the school.
Primary	Keyboarding program.
Primary	Computers, keyboards and program designed for <i>touch keyboarding</i> .
Secondary	Not known.
Secondary	None.
Secondary	Nil - computer course Yr 8, computer 8, 9, 10, 11, 12
Secondary	Keyboarding text, keyboard games.
Secondary	Software.
Tertiary	Computer laboratories, left to students to teach themselves.
Tertiary	Don't know.
Tertiary	Not aware of any.
Tertiary	Library facilities - Overseas students receive support.
Tertiary	Don't know.

Table 26 Institutional resources available to assist in teaching keyboarding

Finding #12: All (100%) of primary, 60% of secondary and 40% of tertiary respondents were able to identify available teaching resources for keyboarding.

Type of computer keyboard work by teachers

Question 13 asked “Please indicate the type of keyboard work you are expected to perform in relation to your teaching?” Email, spreadsheets, report writing, teaching resources, internet access and word processing were listed for selection by respondents. All respondents, indicated some, if not all, of the following tasks are performed:

Institution	Email	Spread sheets	Report Writing	Teaching Resources	Internet access	Word processing
Primary	☒	☒	☒	☒	☒	☒
Primary		☒		☒	☒	☒
Primary	☒	☒	☒	☒	☒	☒
Primary	☒	☒	☒	☒	☒	☒
Primary	☒	☒	☒	☒	☒	☒
Secondary	☒			☒	☒	☒
Secondary	☒	☒	☒	☒	☒	☒
Secondary	☒		☒	☒	☒	☒
Secondary	☒	☒		☒	☒	☒
Secondary	☒	☒		☒	☒	☒
Tertiary	☒	☒	☒	☒	☒	☒
Tertiary	☒	☒	☒	☒	☒	☒
Tertiary	☒	☒	☒	☒	☒	☒
Tertiary	☒		☒	☒	☒	☒
Tertiary	☒		☒	☒	☒	☒

Table 27 Keyboard Tasks Performed by Respondents

All respondents identified internet access, teaching resources and word processing as keyboarding activities, with Email closely following. It is important to note that all respondents are currently using a keyboard as part of their teaching practice.

Finding #13: All (100%) of respondents are expected to use a computer keyboard to perform their teaching practice and specifically identified teaching resources, internet access and word and 90% identified email processing as common across all sectors.

Additional tasks required of teachers

Question 13 also allowed an opportunity for respondents to nominate “Other” types of keyboard work. The following table identifies the keyboarding tasks expected of the respondents to perform their teaching duties. The tasks are ranked according to the number of responses.

Institution	Other type of keyboard work
Primary	
Primary	
Primary	
Primary	Mouse operated software for kids.
Primary	
Secondary	
Secondary	
Secondary	
Secondary	Corel Draw, Photoshop, Quilt Pro-Patchwork.
Secondary	
Tertiary	Photoshop.
Tertiary	Maths software, graphics calculator, maths text and diagrams.
Tertiary	
Tertiary	
Tertiary	Blackboard Manager site and presentations.

Table 28 Keyboard Task Expectations of Respondents by Usage

Finding #14: One third (33%) of respondents identified specific subject related keyboard tasks.

Computer keyboarding style of teachers

Question 14 asked “What method of keyboarding do you use?” The table below identifies the different keyboarding styles respondents use.

Institution	Method of Keyboarding
Primary	<i>Touch Keyboarding</i>
Primary	<i>Touch Keyboarding</i>
Primary	Between Touch and Hunt and Peck
Primary	Hunt and peck.
Primary	Hunt and peck
Secondary	In between <i>touch keyboarding</i> and hunt and peck
Secondary	Hunt and peck
Secondary	Hunt and peck
Secondary	Hunt and peck.
Secondary	<i>Touch keyboarding</i>
Tertiary	<i>Touch Keyboarding.</i>
Tertiary	Hunt and peck
Tertiary	Hunt and peck
Tertiary	Hunt and peck
Tertiary	Hunt and peck

Table 29 Style of Keyboarding Method of Respondents

9 respondents use “*hunt and peck*”, with 2 respondents suggesting ‘other’, a mixture of the two styles. Only 4 respondents self identified *touch keyboarding* as their method. The respondents made a self assessment without the assistance of a formal testing process.

The following table identifies the respondents' keyboarding method by sector.

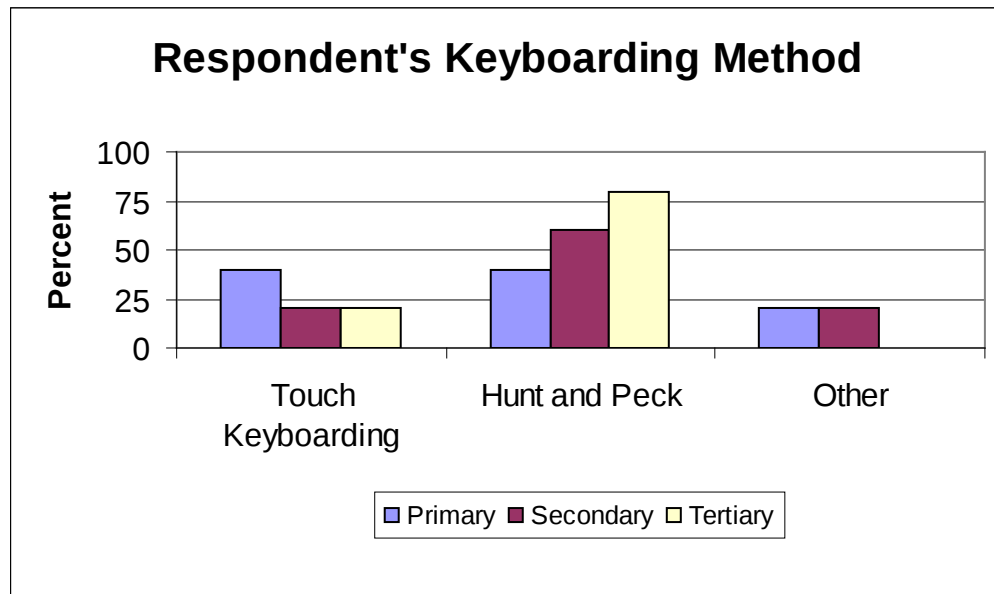


Table 30 Style of Keyboard of Respondents by Sector

The highest number of respondents using the “*hunt and peck*” method is within the tertiary sector. As detailed earlier in this chapter, this sector also spends the highest number of hours per week on a keyboard.

Finding #15: One quarter (27%) of respondents used *touch keyboarding* and the majority of respondents who don’t is dominated by the tertiary sector.

Teachers time spent using computer keyboarding style

Question 15 asked “How many years have you been using this method?” The table below indicates the number of years respondents have been using their current method of keyboarding.

Institution	Number of Years Keyboarding
Primary	30
Primary	4
Primary	20
Primary	35
Primary	15
Secondary	6
Secondary	15
Secondary	30
Secondary	20
Secondary	8
Tertiary	35
Tertiary	20
Tertiary	30
Tertiary	40
Tertiary	20

Table 31 Number of years respondents have been keyboarding

Finding #16: All (100%) respondents have been keyboarding between 16 and 29 years.

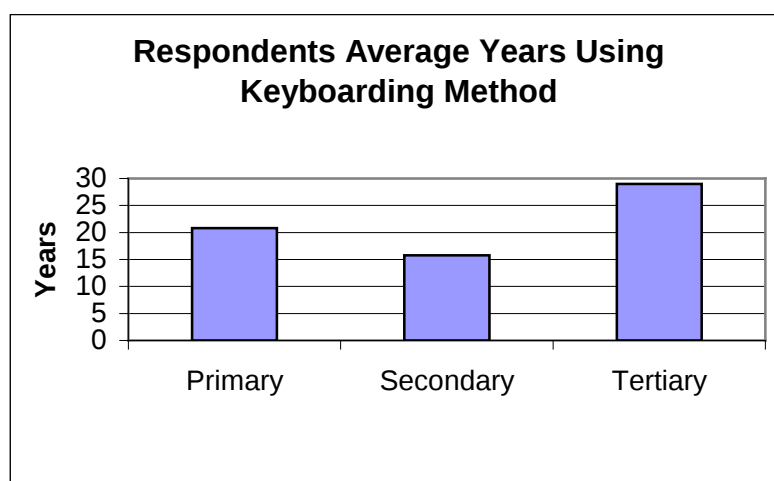


Table 32 Respondents Average Years Using Keyboarding Method by sector

Occupational Health & Safety concerns with "hunt and peck"

Question 16 asked “What are the Occupational Health and Safety concerns with relation to students using the “hunt and peck” method of keyboarding?” The table below outlines the respondents view.

Institution	OH&S concerns with “hunt and peck”
Primary	Neck and back curved, no support for wrists and feet.
Primary	Neck strain, finger damage.
Primary	Sight/Posture.
Primary	Bad posture, fatigued back, weak arms and hands.
Primary	sore finger tips, eye strain.
Secondary	RSI.
Secondary	Don't know.
Secondary	RSI problems, frustration, slow.
Secondary	Crouched posture, no ergonomic furniture.
Secondary	RSI, frustration.
Tertiary	Not good for the neck.
Tertiary	Don't know.
Tertiary	Fatigue and RSI.
Tertiary	Eyesight and RSI.
Tertiary	Posture, neck , shoulders, right fingers - RSI.

Table 33 OH&S concerns with regard to “hunt and peck” keyboarding

Finding #17: The majority (87%) of respondents were aware of the potential risk of RSI, poor posture and eye strain as a result of the “hunt and peck” method of keyboarding.

Advantages/disadvantages “hunt and peck” style

Question 17 asked “What are the advantages of using the “hunt and peck” keyboarding method?” and Question 18 asked “What are the disadvantages of using the “hunt and peck” keyboarding method?” The responses to both questions are listed in the table below.

Institution	Advantages of "hunt and peck"	Disadvantages of "hunt and peck"
Primary	5 minutes only - less time consuming.	time consuming and concentrating - can lose train of thought.
Primary	good to start, familiarity.	time constraints.
Primary	Self navigation rather than being told. Visualise at one to one.	Speed, OH&S, time, usage of computers.
Primary	Not a lot of practise, each and quick.	OH&S, slower in the long run.
Primary	Computer thing, without training.	Not view errors on monitor, slower, strenuous on eyes and fingers.
Secondary	Students not disadvantaged in the use of the computers.	Can be slow.
Secondary	Can't see any.	too slow - many mistakes.
Secondary	Nil.	Frustration, slow.
Secondary	No advantage.	More profitable time factor.
Secondary	None.	time consuming.
Tertiary	None - young children writing to do something with the computer.	Lack of speed and concentration can interfere with content.
Tertiary	Accuracy - looking to check.	Keep stopping to look, slower.
Tertiary	No training required.	Speed, fatigue, inaccuracies.
Tertiary	Self taught.	Slow and inaccurate.
Tertiary	See mistakes, familiarity, difficult to retrain.	OH&S and too slow.

Table 34 Advantages and disadvantages of “hunt and peck” style

Finding #18: Respondents felt that “hunt and peck” style had the advantage of no initial training time and disadvantage of being slow, inaccurate, cause of OH&S problems and tiring.

Occupational Health & Safety concerns with *touch keyboarding*

Question 19 asked “Are there any Occupational Health and Safety concerns with relation to students using the *touch keyboarding* method?” The table below outlines the respondents view on the OH&S concerns with regard to *touch keyboarding* method.

Institution	OH&S Concerns with <i>Touch Keyboarding</i>
Primary	None.
Primary	Not that I can think of.
Primary	Posture, placement, weight on palms and more free movement.
Primary	Most probably even with encouragement. I don't know if we are teaching correctly or setting bad habits.
Primary	Stretching fingers of smaller hands may cause difficulties.
Secondary	RSI if not seated correctly in relation to height and eye distance from monitor.
Secondary	Not known.
Secondary	Having correct equipment.
Secondary	Hunched posture, correct furniture.
Secondary	Nil
Tertiary	No-one is concerned with correct posture.
Tertiary	Don't know.
Tertiary	Not if taught appropriately and ergonomically.
Tertiary	Eyesight difficulties with screen, RSI alleviated.
Tertiary	Practise.

Table 35 OH&S concerns with regard to *touch keyboarding*

Finding #19: Respondents held mixed views about the Occupational Health and Safety risks associated with the *touch keyboarding* method of keyboarding.

Advantages/disadvantages using *touch keyboarding* style

Question 20 asked “What are the advantages of using the *touch keyboarding* method?”

Question 21 asked “What are the disadvantages of using the *touch keyboarding* method?” Responses to both questions are listed below.

Institution	Advantages of <i>Touch Keyboarding</i>	Disadvantages of <i>Touch Keyboarding</i>
Primary	Once mastered, speed and can focus on screen.	None.
Primary	Efficiency and proficiency.	Initial time to learn and develop.
Primary	Speed, least amount of problems.	Personal level, seeing comparison, self-esteem, reinforce to keep going, best method.
Primary	More proficient, speed and accuracy, body.	Takes a long time in gaining skills, practise, English syllabus encourages speed and keyboarding slows down when keying in, frustrated with the way they want to go.
Primary	Speed and proficiency.	Nil.
Secondary	Speed.	Cannot see any.
Secondary	Faster.	Not known, but may be expected to do more computer record keeping if I could touch type.
Secondary	Faster, easier.	Nil.
Secondary	Speed of input and output.	Nil.
Secondary	Less time consuming, spelling, less frustration.	Nil.
Tertiary	Speed, not distracting from content.	Initial time in learning.
Tertiary	Faster.	Not competent - more errors.
Tertiary	Speed and reduce fatigue.	Training required.
Tertiary	Speed and accuracy.	Learning the skill is not easy.
Tertiary	Faster work and less prejudice on process.	None.

Table 36 Advantages and Disadvantages of *Touch Keyboarding*

Finding #20: Respondents felt that *touch keyboarding* had the advantage of speed, accuracy and proficiency and disadvantage of initial training time and not an easy skill to learn.

Difficulties in learning to touch keyboard

Question 22 asked “What are the difficulties in learning to touch keyboard?” The table below outlines the respondents views on the difficulties in learning how to *touch keyboard*.

Institution	Difficulties in learning to Touch Keyboard
Primary	Demanding of teacher time in class - limitation with the number of students needing one to one supervision and advice. 15 computers:1 teacher.
Primary	Time and familiarity with keyboards.
Primary	availability to practise at home or at school. Availability of computers for group of students/lack of progress/being visually seen at child's work station, management.
Primary	Time, practise, enough keyboards, lab time, equity.
Primary	Teacher, can't teach old dogs new tricks. Students - some find it boring, some okay with repetition.
Secondary	If taught from the beginning the correct method, old habits or habits not formed.
Secondary	Age, habits, no time to retrain.
Secondary	Repetition, being taught, spelling.
Secondary	Don't know, tried to learn alone, frustrated, gave up.
Secondary	Opportunities to learn - time to do it.
Tertiary	Self discipline required to learn as a separate activity to an essay.
Tertiary	Breaking the habits already learned.
Tertiary	Time commitment.
Tertiary	Difficult to concentrate on product and not the process, maintaining eye on screen.
Tertiary	Learning a new method, less difficult for students.

Table 37 Difficulties in learning *touch keyboarding*

Finding #21: Respondents identified equipment, time, relearning, self discipline and demand on teaching time as difficulties in learning *touch keyboarding*.

Difficulties in teaching *touch keyboarding*

Question 23 asked “What are the difficulties in teaching *touch keyboarding*?” The table below indicates the respondents views on the difficulties of teaching *touch keyboarding*.

Institution Difficulties in teaching *Touch Keyboarding*

Primary	Demands, time with the students.
Primary	Number of children in the class and personal instruction.
Primary	Term time/hardware/how much time-KLA areas.
Primary	Equity, lab time, availability, teacher training.
Primary	Small hands in Year 3 and 4. Practise for a consistent 2 hours as apposed to 15 computers for half the class.
Secondary	Resources.
Secondary	Lack of training/experience.
Secondary	Repetition, teacher skills, learning problems, behavioural problems, number of students in the class.
Secondary	Not knowing how to do it yourself. No process.
Secondary	Problem with behavioural, learning difficulty students.
Tertiary	Don't know, never taught it.
Tertiary	Breaking the habits already learned, go back to the beginning, time consuming.
Tertiary	Can't answer - not familiar.
Tertiary	Frustration when students lose position and look.
Tertiary	Don't know anything about it.

Table 38 Difficulties in teaching *touch keyboarding*

Finding #22: Respondents identified equipment, time, lack of training, teacher:student ratio and demand on teaching time as difficulties in learning *touch keyboarding* with some respondents simply unable to answer the question.

Available institutional resources

Question 24 Are the resources available adequate? Yes/No” Question 25 asked “If not, why not?” The following table indicates the respondents views on the resources available within their institution and whether the resources are considered adequate for their needs.

Institution	Yes	No	Question 25
Primary		☒	Program administered without too much teacher intervention.
Primary	☒		
Primary	☒		
Primary	☒		Yes in the lab, in the classroom ergonomic chairs need replacement.
Primary	☒		Would prefer 30 computers in lab.
Secondary		☒	Computers that work and more finance for software.
Secondary		☒	Time and money.
Secondary		☒	Teaching time, periods.
Secondary		☒	Ergonomic furniture, need particular training.
Secondary	☒		
Tertiary	☒		
Tertiary			Don't know.
Tertiary		☒	Opportunity to attend training sessions.
Tertiary			Don't know.
Tertiary			Don't know.

Table 39 Resources available and their adequacy for teaching

Finding #23: In relation to available resources, 40% of respondents were satisfied, 40% were unsatisfied and 20% were unaware.

Interest in changing computer keyboarding style

Question 26 asked “Would you like to change your current method of keyboarding? Yes/No” Question 27 asked “Why would you like to change your current method of keyboarding?” The table below details the respondents response to the question, would you like to change your current method of keyboarding and asked for reasons why.

Institution	Yes	Why would you like to change
Primary	☒	More proficient.
Primary	☒	to become more proficient.
Primary	☒	Stick more with touch typing.
Primary	☒	See the adapted method is not efficient, back injury restricts time.
Primary		
Secondary	☒	Lesson in touch typing.
Secondary		
Secondary	☒	Time, speed.
Secondary	☒	Halve the 25 hours keyboarding by increased speed.
Secondary		No.
Tertiary		
Tertiary		If it was relatively easy to do and didn't take too much effort and time.
Tertiary		
Tertiary	☒	Ease of use and speed.
Tertiary		Faster but time is an issue.

Table 40 Respondents views on changing method of keyboarding and reasons

Of the 15 respondents, 8 would like to change the current style of keyboarding. The reasons for wanting to change to *touch keyboarding* are:

- ☐ Speed
- ☐ Ease of use
- ☐ Increase efficiency and proficiency
- ☐ Reduce keyboarding time

In anticipation of the change, respondents listed the following difficulties in moving from “*hunt and peck*” to *touch keyboarding*:

- ❑ Time
- ❑ Unlearning bad habits
- ❑ Frustration
- ❑ Reduction in speed initially
- ❑ Loss of productivity during relearning phase
- ❑ Deadlines often encourage reverting to old habits

Finding #24: Half (53%) of respondents would like to change their keyboarding style from “hunt and peck” to “*touch keyboarding*”.

Negative learning impact in changing styles

Question 28 asked “What is the negative learning impact in wanting to change methods of keyboarding?” When asked, most respondents identified some negative learning impacts in changing methods of keyboarding.

Institution	Negative learning impact in changing
Primary	Unlearning bad habits.
Primary	Time.
Primary	Not negative, a challenge. Change for the better.
Primary	Frustration, reverting to old habits, time restraints.
Primary	Very hard to change, to unlearn what is difficult and take new skills on board.
Secondary	Time.
Secondary	None.
Secondary	Frustration, stiff joints.
Secondary	Backwards in speed under deadlines - that's difficult.
Secondary	None.
Tertiary	Previous method may interfere with learning the new.
Tertiary	Inconvenient until transition is finished, depends on habits.
Tertiary	Time commitment.
Tertiary	Lapse period where not productive. Tried and have given up, couldn't get things done.
Tertiary	Impediments in life, get by without it.

Table 41 Negative learning impact on changing methods of keyboarding.

Finding #25: The majority of respondents were aware that there is a negative learning impact in changing keyboarding methods.

Responsibility to deliver *touch keyboarding* programs

Question 29 asked “Who do you feel should be responsible to deliver *touch keyboarding* programs to your students?” All respondents feel that the responsibility for teaching *touch keyboarding* resides with suitably qualified and trained teachers, who are personally proficient in *touch keyboarding*. These experts could be from the technical sector, the classroom teacher or a trained computer teacher. One respondent from the tertiary sector suggested that students should arrive at Stage 7 with these skills.

Institution	Who should be responsible
Primary	Person working in the computer room with program.
Primary	As a class teacher/ extra RFF - KLA time.
Primary	Class teacher support from policy and computer coordinator.
Primary	Classroom teacher/RFF teacher.
Primary	Computer expert of every teacher in classroom.
Secondary	Trained teachers.
Secondary	People with suitable expertise.
Secondary	Department of Schools.
Secondary	Teachers with training - TAFE secretarial, upskilled.
Secondary	Parents and teachers.
Tertiary	There should be dedicated teachers of keyboarding employed by the University.
Tertiary	Hope to come with skills from schools - Learning Skills Unit.
Tertiary	Appropriate qualifications.
Tertiary	Support staff - specially trained like TAFE, import a course and teacher.
Tertiary	Any <i>touch keyboarding</i> excellence and keyboard experts.

Table 42 Responsibility for teaching *touch keyboarding*

Finding #26: All respondents feel that the responsibility for teaching *touch keyboarding* resides with suitably qualified and trained teachers.

General comments from teachers

Question 29 asked “Any further comments?” Respondents were offered an opportunity to provide any further comments at the end of their interview. The following are a selection of those comments:

Institution	Any Further Comments
Primary	As Computer Coordinator the Department has not supplied teacher training for this. Professional Development is lacking or non existent in this area.
Primary	Main concern is that students are not fully developed. Specialised keyboard or learn in later years.
Secondary	Literacy issues - word recognition of word shape. No professional training as part of the job. Being a touch keyboarder does not make a <i>touch keyboarding</i> teacher.
Tertiary	Computers available for over 20 years. Its time educators were serious and taught at Kindergarten to Tertiary. Not touch typing is like a carpenter using a hammer as a screwdriver.
Tertiary	Not really. Change - needs to demonstrate relevance. Benefit - demonstrate why people should change.
Tertiary	Touch Typing is a desirable thing. Hard Yakka.
Tertiary	I wish I could touch keyboard, It is good for students - less stress.

Table 43 Further comments on interview

Testing of *Touch Keyboarding* Skills

The respondents within this group represent students entering UoN through an Open Foundation program and as undergraduates. These students have self-identified a need to improve their computing skills. The course is conducted as a summer bridging course with a major component of this course the acquisition of *touch keyboarding* skills.

Keyboarding entry skills

The researcher, in the role of lecturer was able to collect data on two groups attending the bridging program in 2003-2004. 16 participants in Group 1 and 4 participants in Group 2 completed the Bridging Course. Participants were tested under the Australian Standard at the beginning and end of the course. The testing procedure involved:

- ❑ A practice warm up for 10 minutes
- ❑ 5 minute test using an approved test paper
- ❑ analysis of the test in accordance with the Australian Standard AS2708

Delivery of the introduction to computing course

The students participated in a two week, 18 hour course conducted over nine 2 hour sessions. The *touch keyboarding* text used was *Keyboarding Plus*, written by the researcher for students from Year 3 to adults. The *touch keyboarding* component of the course involved one hour in each of the nine sessions.

Introduction to computing bridging course - testing *touch keyboarding*

Students attending the bridging course are tested at the first and last session. The Australian Standard test measures the words per minute over 5 minutes. Examples of the practice and formal tests used are available in Appendix O. This provides a reliable method of comparing results between students to analyse the results and progress.

The speed is calculated by:

Characters entered / 5 strokes for a standard word / 5 minutes

The accuracy is calculated by:

*Calculated standard words entered over 5 minutes – number of words containing
an error / calculated standard words entered over 5 minutes*

The table below indicates the results for 2003. It details the number of students, the results of their first and second speed test and the number of sessions attended. The results for any students absent for the first or second speed test are not displayed.

Student	Speed Test 1	Accuracy Test 1	Speed Test 2	Accuracy Test 2	Attendance 9 sessions
1	12.5	98.4	15.0	100.0	8.0
2	27.3	99.3	28.5	99.4	9.0
3	6.7	100.0	8.0	92.5	9.0
4	10.7	100.0	9.0	100.0	9.0
5	17.8	100.0	13.8	100.0	8.0
6	19.9	89.9	13.8	95.5	9.0
7	51.0	100.0	56.6	99.6	9.0
8	5.2	92.0	4.0	89.9	9.0
9	12.1	95.5	5.5	89.0	7.0
10	16.0	98.7	12.2	100.0	7.0
11	21.6	96.3	25.2	98.4	9.0
12	29.5	97.3	31.2	98.7	9.0
13	26.1	100.0	25.2	99.2	9.0
14	49.1	99.6	49.8	99.2	7.0
15	23.5	98.3	15.0	98.7	9.0
16	17.2	100.0	21.0	96.2	9.0
Mean	21.6	97.8	20.9	97.3	8.5

Table 44 2003 Introduction to Computing Bridging Course

Note: Bold denotes results meet Australian Standards testing accuracy requirement.

In the first speed test students use any style of keyboarding to achieve a result and in the second speed test students are required to use the *touch keyboarding* skills acquired during the course. The second speed test is evidence of the student's ability to touch keyboard under test conditions and of their ability to acquire the skill through this course.

Students 5, 10 and 15 successfully passed the Australian Standard test using their newly acquired *touch keyboarding* skills, with students 3, 6, 8, 9 and 16 similarly demonstrating their new skill but not able to demonstrate the accuracy requirement

during the test. It should be noted that the disparity in speeds from 4 wpm to 56.6 wpm identifies that the students with lower *touch keyboarding* speeds are greatly disadvantaged when tertiary institutions have an expectation that students will use a computer to complete coursework.

The table below indicates the results for 2004. It details the number of students, the results of their first and second speed test and the number of sessions attended. The results for any students absent for the first or second speed test are not display.

Student	Speed Test 1	Accuracy Test 1	Speed Test 2	Accuracy Test 2	Attendance 9 sessions
1	21.1	100	14.3	100	8
2	7.9	93.3	10.6	100	9
3	6.5	91	5.1	100	9
4	12.7	100	11.1	96.4	8
Mean	12.1	96.1	10.3	99.1	8.5

Table 45 2004 Introduction to Computing Bridging Course

Note: Bold denotes results meet Australian Standards testing accuracy requirement.

In the first speed test students use any style of keyboarding to achieve a result and in the second speed test students are required to use the *touch keyboarding* skills acquired during the course. The second speed test is evidence of the student's ability to touch keyboard under test conditions and of their ability to acquire the skill through this course.

This cohort of students were more closely aligned in their enrolling skills and final test results. The results do identify one student number 3 whose results indicate low level of skill and in the researcher's experience can reflect low level of confidence in computer usage.

Of marked interest is the difference between the number of students attending the 2003 course and the 2004 course and is an indicator of the students who completed the two week courses. These courses have a capacity to enrol 25 students.

The Introduction to Computer Bridging Course at the University of Newcastle is available and under utilised as a resource by students and Faculties. With respect to the individual skills of students they are very diverse with students arriving at tertiary studies with a range of keyboarding speeds from 5.2 wpm to 51.5 wpm. This places the student with lower skills at a distinct disadvantage to students with moderate to high levels of skill.

Finding #27: Students are enrolling in tertiary study with diverse ranges of keyboarding skills from low to high levels of proficiency.

In teaching tertiary students software applications within a Computer Bridging Course over the last five years, the researcher is aware that with increased levels of keyboarding skills, students perform computer tasks with increased confidence. Limited keyboard familiarity and confidence in basic computer tasks holds students back when learning new software applications.

The results in Tables 44 and 45 identify several students who scored a lower test result in Test 2 than in Test 1 (ie students 5, and 6 in Table 44 and students 3 and 4 in Table 45). As the researcher knows from long experience teaching *touch keyboarding*, there is an initial drop in speed while students become more familiar and confident with the newly acquired skill.

It is worth noting in Table 44 that students 2, 7, 11, 12 and 14 enrolled in the course with *touch keyboarding* skills and this is evidenced by their initial high scores in Test 1 and increased scores in Test 2. In the researcher's experience, scores in the high 20's with 98% accuracy or higher, usually indicates *touch keyboarding* skills.

Students in 2003 and 2004 were able to demonstrate the acquisition of *touch keyboarding* skills under Australian Standard test conditions.

Finding #28: Tertiary students are able to acquire *touch keyboarding* skills through tuition and a structured program.

Observation sheet

The Observation Sheet was designed to assist in the recording of the different posture and the head movement in use by students undertaking the *touch keyboarding* programs. It was to be administered before and after the program.

The result was that all six students, three from each group, using “*hunt and peck*” method, were found to sit at a computer keyboard incorrectly with their shoulders curved and head bent forward placing the monitor above the recommended line of eye sight.

Finding #29: Each student observed using the “*hunt and peck*” method of keyboarding used inappropriate posture when keyboarding.

Frequency diagram

The Frequency Diagram required the researcher to record head movement over a two minute period. A second requirement was to indicate whether the head movement was towards the keyboard, the screen or the text.

This research tool was used during the UoN Bridging program in 2003. Three students, “*hunt and peck*” method of keyboarding, were observed and recorded over a two minute period. All three students moved the head frequently between looking at the keyboard, screen and text and the number of movements to each were constant.

The difficulty with this research tool is the rapid head movement of some students caused the accuracy of the data to be questionable. It was noted that all students observed keyboarding using the “*hunt and peck*” method moved their heads between the keyboard, screen and text, however, the recording of the number of movements proved too difficult for a single observer. As the validity of this research tool was found to be questionable, this process was not repeated on the 2004 participant group.

Finding #30: Correct practice in using the Frequency Diagram Research Tool will require further development of the instrument or with two observers to take the frequency of head movement and direction.

Workstation checklist

The Princeton University Computer Workstation Checklist (2002) provide an instrument for the evaluation of ergonomic adjustments for human use of a computer workstation

The UoN management of the technology computer laboratories conduct an OH&S check on all workstations four times a year. The result was that all six students, three from each group, using “*hunt and peck*” method, were found to sit at a computer keyboard incorrectly with their shoulders curved and head bent forward placing the monitor above the recommended line of eye sight.

Finding #31: The Workstation Checklist supported the data collected through the Observation Sheet and indicated that the workstations available for student use met the recommended OH&S requirements.

Summary of Research Findings

Current practice in learning keyboarding

- Finding #1:** Respondents indicated that all students, enrolled in Kindergarten to Post Graduate study, are expected to use a computer keyboard as part of their coursework.
- Finding #2:** The amount of time students are expected to spend on a computer keyboard each week increases in accordance with the level of coursework.
- Finding #3:** All students are expected to use word processing as part of their coursework.
- Finding #4:** The majority (87%) of students in this study possess low level of keyboarding proficiency.
- Finding #5:** Respondents were clear about how to learn handwriting and placed teaching responsibility within the primary sector.
- Finding #6:** Respondents were unclear about how to learn *touch keyboarding* and where the teaching responsibility should lie.
- Finding #7:** Respondents held mixed views on when computer keyboarding should be introduced, however, there was a trend towards Stage 2 and Stage 3.

Current practice in teaching keyboarding

- Finding #8:** Half (53%) the respondents possess low level of keyboarding proficiency with this group dominated by the tertiary sector (80%).
- Finding #9:** The majority (93%) of the respondents identified self-tuition, external programs or were unaware of how teachers learn how to *touch keyboarding* and only one (7%) identified “in-service”.
- Finding #10:** On average, all respondents spend a minimum of 5 hours per week on a computer keyboard with the tertiary sector spending 26 hours per week at a computer keyboard.
- Finding #11:** There appears to be little support or a low awareness of the support available to teachers to improve their *touch keyboarding* skills.

- Finding #12:** All (100%) of primary, 60% of secondary and 40% of tertiary respondents were able to identify available teaching resources for keyboarding.
- Finding #13:** All (100%) of respondents are expected to use a computer keyboard to perform their teaching practice and specifically identified teaching resources, internet access and word and 90% identified email processing as common across all sectors.
- Finding #14:** One third (33%) of respondents identified specific subject related keyboard tasks.

Touch keyboarding or hunt and peck

- Finding #15:** One quarter (27%) of respondents used *touch keyboarding* and the majority of respondents who don't is dominated by the tertiary sector.
- Finding #16:** All respondents (100%) have been keyboarding between 16 and 29 years.
- Finding #17:** The majority (87%) of respondents were aware of the potential risk of RSI, poor posture and eye strain as a result of the "hunt and peck" method of keyboarding.
- Finding #18:** Respondents felt that "hunt and peck" style had the advantage of no initial training time and disadvantage of being slow, inaccurate, cause of OH&S problems and tiring.
- Finding #19:** Respondents held mixed views about the Occupational Health and Safety risks associated with the *touch keyboarding* method of keyboarding.
- Finding #20:** Respondents felt that *touch keyboarding* had the advantage of speed, accuracy and proficiency and disadvantage of initial training time and not an easy skill to learn.

Issues in teaching and learning touch keyboarding

- Finding #21:** Respondents identified equipment, time, relearning, self discipline and demand on teaching time as difficulties in learning *touch keyboarding*.
- Finding #22:** Respondents identified equipment, time, lack of training, teacher:student ratio and demand on teaching time as difficulties in

learning *touch keyboarding* with some respondents simply unable to answer the question.

Finding #23: In relation to available resources, 40% of respondents were satisfied, 40% were unsatisfied and 20% were unaware.

Finding #24: Half (53%) of respondents would like to change their keyboarding style from “hunt and peck” to “*touch keyboarding*”.

Finding #25: The majority (87%) of respondents identified at least one negative learning impact in changing keyboarding methods.

Finding #26: All respondents feel that the responsibility for teaching *touch keyboarding* resides with suitably qualified and trained teachers.

Teaching *touch keyboarding* to tertiary students

Finding #27: Students are enrolling in tertiary study with diverse ranges of keyboarding skills from low to high levels of proficiency.

Finding #28: Tertiary students are able to acquire *touch keyboarding* skills through tuition and a structured program.

Finding #29: Each student observed using the “*hunt and peck*” method of keyboarding used inappropriate posture when keyboarding.

Finding #30: Correct practice in using the Frequency Diagram Research Tool will require further development of the instrument or with two observers to take the frequency of head movement and direction.

Finding #31: The Workstation Checklist supported the data collected through the Observation Sheet and indicated that the workstations available for student use met the recommended OH&S requirements.

Analysis - Emerging Trends

This exploratory study found that *keyboarding* moved from a vocational skill in the 20th Century, perfected by those employed as stenographers, to a universally required writing tool in the 21st Century. Secondly, this study found that the disappearance of *touch keyboarding* from the national vocational curricula is almost without notice, certainly without major comment or obvious concern.

At the time of its introduction, the mouse offered the computer operator speedy and comfortable relief from total dependence on the discipline of the keyboard for data entry and engagement of software features. However the introduction of Email brought the computer operator back to the keyboard with the entering of text as a main component in using the communication tool.

Email is a modern day writing discipline allowing exchange of communication and ideas and the transfer of files whether text or visual images. Email requires effective use of the keyboard for text messaging and requires composition at the keyboard .

As part of the communication strategy, the NSW Department of Education and Training provided Email addresses for all students, educators and general staff to use. Similarly, for the University of Newcastle Email is the preferred form of communication with students. Further, all library, course information and notices are disseminated through the Email system.

This project found that computer keyboarding is a skill required by students at all levels of education. This finding has implications for teaching and learning keyboarding skills.

Teaching and learning *touch keyboarding*

The manner in which students learn and educators instruct in the acquisition of *touch keyboarding* skills, remains the same. For over 30 years the instructional texts of West (1979), Mackay and Williams (1978) and McNicol (1968) have been the reference texts for the training of typewriting instructors and now for word processing and keyboarding teachers (CESA, 2003). The move from typewriter to computer keyboard did not diminish the value nor the importance of these texts. The skill acquisition of *touch keyboarding* was a constant and therefore the development of new texts appears to be unnecessary.

The literature further revealed that although the method of teaching and learning *touch keyboarding* remains the same, the requirements within the Australian curricula have changed. The changes (ANTA, 2002) moved learning how to touch keyboard from a core module to an elective module, with the inclusion of the elective determined on an individual level by the assessor within the National Training Framework.

Furthermore, with the introduction of VET in Schools, the qualifications and experience of the assessor have changed to reduce the level of vocational qualification required and lower the vocational experience from 3 years to 2 weeks. As the Australian Qualifications Framework (ANTA, 2002) offers national recognition of national training packages, the importance of the qualifications and experience of the assessor is significant. However, it is outside the parameters of this project to investigate the affect of this upon student outcomes and articulation between training providers.

Within the instructional texts are well documented barriers to learning *touch keyboarding* such as change from one style to another, time limitations, poor application to learning. This project found that there are additional barriers in Australia. Within the national curricula the disappearance of *touch keyboarding* as a core component measured against a standard creates a new situation for students. As national training packages are offered by a variety of training providers the removal of a standard may prove to be a barrier to the ease of movement previously available to students and employees when moving between qualifications or jobs.

Touch keyboarding within the Curricula

As discussed in the literature review *touch keyboarding* has disappeared from the vocational curricula in Australia. This has broad implications for the business community who were previously able to employ staff with trained and measured keyboarding skills and are now faced with employing staff who may arrive with ingrained poor habits and low levels of skill. This exposes employers to additional risk where:

- (i) jobs are no longer designated as requiring *touch keyboarding* skills and
- (ii) staff arrive with keyboarding skills acquired in an ad hoc manner and without appropriate training in OH&S issues.

In this research study the literature review revealed a trend where *touch keyboard* as a vocational skill is disappearing. At the same time *touch keyboarding* is present in primary and secondary curricula in the United States of America and in other States within Australia.

Increasing expectations of computer keyboarding

The findings in this research project reveal that all students and educators are expected to use a computer keyboard to meet the requirements of their coursework and educational employment. These findings are cross sectoral and encompass primary, secondary and tertiary institutions from Kindergarten to Post Graduate studies.

A further finding is that the level of expectation increases in association with the level of enrolment. The demand on students and educators at tertiary level is higher than secondary which is higher than primary.

As the level of expectation increases from primary through to tertiary, the general level of ability in students and educators is decreasing. This project found that the computer keyboarding expected for tertiary students and educators was high and at the same time the level of computer keyboarding proficiency was low. This imbalance of expectancy and efficiency will impact on the time required for keyboarding of both students and educators at the tertiary level.

Definition of a Writing Tool

In analysing the emerging trends there is a concern that, as vocational skills disappear and computer keyboarding expectations increase, these two trends will simply continue and the result will be a loss of a valuable skill and the poor skills encouraged. Both outcomes would have a negative impact on the business and educational communities through loss of time and efficiency.

At this point a more lateral approach is called for to try and guide these trends into a manageable strategy for the benefit of the business and educational communities and to maximise the efficient usage of a computer keyboard and time resources. For example to define computer keyboarding as a writing tool West (1969) recognised the everyday usage of the practice of computer keyboarding as a means of communication and as an alternative writing tool to a pen.

This project found that educators were uncertain of who was responsible for teaching *touch keyboarding* and that they held mixed views as to where it should be taught, although an emerging trend towards Stage 2 and 3 of primary level of schooling was identified as a key area.

Value of *Touch keyboarding*

It was not within the scope of this research project to demonstrate the value of *touch keyboarding* per se, the purpose was to identify the issues in teaching and learning *touch keyboarding*. As such, this project has revealed the disappearance of *touch keyboarding* as a vocational skill from the curricula in Australia. The question remains “is *touch keyboarding* of value?” As one quarter of the participants indicated that they can *touch keyboard* and one half of the participants indicated that they would like to change their keyboarding style, it can be argued that there is evidence of *touch keyboarding* being valued as a skill.

What is uncertain is how valuable and what are the benefits in time or efficiencies? The literature review revealed that previous research was focused on the introduction of typewriting into the primary and secondary sectors. There is no current research data identifying the benefits of *touch keyboarding* in comparison to “*hunt and peck*”

keyboarding. As an experienced *touch keyboarding* teacher, the researcher is aware of the benefits however this is experiential knowledge and is not supported by any serious statistical data analysis.

There is a need for further investigation into the benefits and efficiency in operating a computer keyboarding using *touch keyboarding* method as opposed to “*hunt and peck*” method of keyboarding.

Occupational Health and Safety

This project found through literature and data that there is an OH&S risk associated with using a computer keyboard. The majority of respondents were aware of the potential risk of RSI, poor posture and eye strain as a result of the “*hunt and peck*” method of keyboarding. The view for *touch keyboarding* was different and respondents held mixed views about the OH&S risks associated with the *touch keyboarding* method of keyboarding.

It was further revealed through the literature (Standards Council, 1994; Australian Government, 2004) that OH&S training is important in avoiding the development of poor habits and to raise awareness of potential risk.

The project found that educators were aware of this to a degree and this is supported through evidence within mandatory computer assessment tests (NSW Board of Studies, 2002). There is no evidence in the literature to suggest that the OH&S content within the primary, secondary and tertiary level curricular is similar or equivalent to the standard core module in the National Training Packages (ANTA, 2002).

Limitations of Methodology

In retrospect, data collection in the first term of any primary or secondary school year should be avoided where possible. Selection of this time appears to have been a factor in reducing the number of participants. The organisational duties in settling in students, sorting out classes and associated tasks are at their height in first term. Second term is a more suitable time to interview teachers in educational institutions for a research project.

A further consideration would be that “Yes/No” answers are limiting within a structured interview. Therefore responses such as “Don’t know” would have provided more accurate information. As this became evident from the first interview, “Don’t know” was accepted as a third alternative to “Yes/No” in all interviews or perhaps the Likert type scales would have been more appropriate. There is additional depth to be explored within the structured interview through asking probing questions to elicit additional information. With experience, a researcher can develop the confidence to ask probing questions and be able to deal with the corresponding replies.

The researcher in excluding vocational institutions as a participant group to be interviewed allowed assumed knowledge to bias the selection of participating institutions for the data collection. As revealed through the literature review *touch keyboarding* is now an elective module in the Business Services framework and not a core module as previously taught by the researcher. As a result the current practice in teaching and learning *touch keyboarding* within the vocational sector is from curricular documentation and is not supported through data collection method of a structured interview. In future, the researcher will verify or challenge any assumed knowledge in the early stage of a research project.

The importance of placing boundaries around a research project or identifying strands or themes that are outside the current project became evident through the literature review stage. In retrospect, strategies in mapping and identifying these boundaries earlier would have saved time. It is extremely easy to be sidetracked and even if there is the opportunity to read broadly and become more informed, establishing boundaries would assist in keeping on track and focussed on the project. For example, at the reporting stage areas outside the project like the impact of physical size of students using a computer keyboard or comparison of learning strategies to acquire *touch keyboarding* skills became evident. As a researcher early identification during the planning stage will sharpen the focus and add clarify to the purpose of the project.

Within the data collection tools, the Frequency Diagram could be simplified to register head movement without differentiation between the type of movement or three observers could be enlisted to register the keyboard, screen or text movement of the head. An important point to note is that the students who were observed moved their

heads between keyboard, screen and text at a fast rate which could not be correctly allocated by one observer. The use of video recording, which can be replayed at a slower speed, would allow accurate recording of the head movements.

In 2002, at the beginning of the research project it was my belief that *touch keyboarding* was still a core component of the National Training Package for Business Services and it was quite humbling to discover that my understanding was four years out of date. This project has demonstrated to the researcher the importance of remaining current, continuing with professional development and avoiding assumptions.

CHAPTER SIX: CONCLUSION

At the conclusion of the research project there is an opportunity to summarise and make recommendations. These recommendations may be for change, improvement or for further investigation.

This research project provided a vehicle for the researcher to engage in further reading, develop a more national understanding of the issue, look abroad at what is happening internationally and identify through appropriate methodology what is actually happening in the educational institutions locally, with a focus on *touch keyboarding*.

The educational stakeholders within this research project were the Australian National Training Authority (ANTA), the New South Wales Department of Education and Training (NSW DET) and the University of Newcastle (UoN). ANTA was a stakeholder due to the changes within the National Training Packages affecting the delivery of Business Services qualifications. The respondents within the study represented involvement of NSW DET and UoN.

Redefinition As A Writing Tool

In past years *touch keyboarding* has been widely acknowledged as a superior vocational skill. If keyboarding could be redefined and recognised as a writing tool this would align keyboarding with handwriting and firmly place it within the ambit of the primary curricula.

One of the difficulties demonstrated in this research is the mixed views of educators on the educational stage at which keyboarding should first be taught and which educational sector should be primarily responsible. Its redefinition as a writing tool offers several advantages and would address this difficulty to some extent.

One advantage is the common acceptance that writing is taught over several stages in the curricula and is the first responsibility of the primary sector. Secondary and tertiary institutions presume that enrolled students are able to write legibly and these sectors then build, apply and synthesise upon the basic foundation of writing. Aligning

keyboarding skill alongside handwriting skill would encourage and direct educators to recognise it as a significant skill requiring resources, teaching strategies and learning opportunities to be acquired successfully and capable of further development.

A second advantage from early development of good practice in using a keyboard would be to reduce the number of students developing bad habits. Retraining from one style of keyboard usage to another requires remedial strategies using scarce resources of time, teaching experience, activities and learning opportunities. For example when using “hunt and peck” style of keyboarding the operator locates a key by sight and then presses the key. As explained in the Ergonomic Handbook a habit learned is very difficult to change (Standards Council, 1994) and changing styles from sight dependent to touch takes time, concentration and practice.

A third advantage could be the increased value and recognition placed on keyboarding when it is defined as a writing tool. Considering the diversity of application handwriting offers as a means of communication, presentation and composition, then keyboarding is an appropriate companion to handwriting within the all embracing classification of writing tool. As found in this research the expectations for using a computer keyboard from Kindergarten to Tertiary education places keyboarding alongside handwriting.

There are two themes emerging from this research. One is the movement of keyboarding from a vocational skill in the 20th Century to that of a writing tool in the 21st Century. This clearly highlights that keyboarding is becoming increasingly recognised as a common feature of everyday life.

The second theme is the disappearance of the highly regarded vocation skill of *touch keyboarding* from the national curricula and the workforce. Recognition of the importance and value of *touch keyboarding* as a vocational skill has declined with the advent of personal computers and the rearrangement of employment tasks.

A successful outcome would appear to be the merging of these two trends, for example as one diminishes the other takes its place. This would reflect *touch keyboarding* moving from within vocation curricula to become embedded across the curricula spectrum as an educational tool. There would appear to be an adequate and appropriate

supply of teachers and widespread availability of facilities to allow this to occur as a natural progression.

At the moment, there is an absence of *touch keyboarding* across the curricula from Primary through to Tertiary sector in New South Wales, Australia that this should be a matter for considerable disquiet. Further study of primary, secondary and tertiary curricula within Australia and internationally would be most beneficial.

Duty of Care

Occupational Health and Safety modules are a core element within National Training Packages. The project found that there is no evidence to suggest that formal training for students and educators in primary, secondary and tertiary institutions is a standard component of the curricula or accompanies an induction to working in a technology environment. As evidenced by this research project, students from Kindergarten to Tertiary studies are required to use a computer keyboard on a weekly basis. Given the new Occupational Health and Safety legislation (2000), this is an area warranting further development because as recognised in the Ergonomic Human Handbook the computer keyboard is identified as a potential risk, training in OH&S is required for operating computer workstations, there are other potential hazards with lighting, temperature and ergonomic equipment. All of these issues can be addressed with appropriate level of training for educators and students.

Another aspect referred to within this project was the issue of computer keyboards being placed in Early Childhood classrooms. The manufacture of a computer keyboard is governed by an Australian Standard (Standards Association of Australia, 1996) and is designed for the hand size of an adult person. This issue was outside the scope of this research project and the researcher is unaware of the ergonomic implications of using mismatched equipment and human size on developing children. However, this may require further investigation.

Efficient Use of a Computer Keyboard

The project found that there is no recent empirical research evidence that *touch keyboarding* actively supports the efficient use of a computer keyboard, however, there

is evidence of current practice in teaching and learning *touch keyboarding* within educational sectors in United States of America and other states within Australia. In order to provide evidence and reinforce the value of *touch keyboarding*, further investigation is required.

A further aspect raised by this project is the link between developing *touch keyboarding* skills and the development of composition skills at a keyboard. In order to provide evidence and reinforce the value of *touch keyboarding* to developing composition skills, further investigation is required.

Recommendations:

Computer keyboarding as a writing tool

- (i) define Computer Keyboarding as a writing tool for educational, vocation and life
- (ii) embed within the primary schooling area the teaching and learning curricula of computer keyboarding as a writing tool with appropriate placement and assessment
- (iii) embed within the secondary, vocational and tertiary curricula the acquisition of *touch keyboarding* skills to assist students to meet the educational expectations of using a computer keyboard to complete course requirements
- (iv) inform the educational community of the expectations and implications of computer keyboarding within the curricula

Duty of Care

- (i) draw the NSW Department of Education and the University of Newcastle's attention to the risk associated with keyboarding and the potential harm to students and educators of repetitive strain that may lead to Occupational Overuse Syndrome, and
- (ii) recommend that students and educators be trained in the appropriate use of a computer keyboard to increase awareness and minimise the likelihood of the development of Occupational Overuse Syndrome.

Further investigation

- (i) encourage further research into the question “what degree of *touch keyboarding* skills are essential for efficient computer usage?” at early childhood, primary, secondary and tertiary levels
- (ii) encourage further research into the question “does a computer keyboard, designed for an adult, have educational value or ergonomic implications within an early childhood setting?”
- (iii) encourage further research into the question “is the standard of student outcomes consistent in national training packages when delivered by vocational, secondary and industry sectors?”
- (iv) encourage further research into the question “is the acquisition of touch keyboarding skills a recommended precursive course to developing composition skills at a keyboard?”

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Appendix A: A hazard identification checklist

This checklist is designed to get you started on the identification of hazards in your office. It gives you suggestions for possible headings and questions you may ask. However, it is not comprehensive. Use this manual to help you develop a checklist that is suited to the needs of your office.

1. Job design

Consider all the tasks required to produce an outcome from each office-based section of the organisation.

- 1.1 Has each job been designed to provide a variety of tasks throughout the day in terms of physical and mental workload?
 - 1.1.1 Are highly repetitive tasks (such as keying) performed for more than 2 hours at any one time?
 - 1.1.2 Do tasks require constant sitting or standing for more than 2 hours at any one time?
 - 1.1.3 Are tasks that require a high level of concentration performed for more than 2 hours at any one time?
 - 1.1.4 Do employees have some choice of when, how and how frequently they perform some tasks or is this determined by the equipment or machine they use or by their supervisor?
 - 1.1.5 Are employees trained to vary tasks and postures throughout the day?
- 1.2 How are individuals given feedback regarding their work performance?

2. Manual handling

- 2.1 Are there objects that require pushing, pulling, lifting, lowering, carrying, holding or moving either repetitively or requiring physical effort or force?
 - 2.1.1 Are there large, awkward or heavy objects to be handled?
 - 2.1.2 Are objects handled more than twice a minute or for more than 30 seconds at a time?
 - 2.1.3 Is awkward posture required while handling loads? Note: The VWA Manual Handling Code of Practice (2000) contains a comprehensive checklist for assessing manual handling risk.

3. Lighting

- 3.1 Is there sufficient lighting for the performance of tasks?
 - 3.1.1 Are employees able to control incoming natural light or glare sources?
 - 3.1.2 Is artificial lighting causing reflections from work surfaces or shadows over the task?
 - 3.1.3 Do employees find they have tired, sore or irritated eyes at the end of a day?

4. Noise

- 4.1 Is noise a problem in the workplace?
 - 4.1.1 Is it difficult to hear a normal voice within a 1 metre distance?
 - 4.1.2 Are there distracting or disruptive noises in the area?
 - 4.1.3 How well do screens or partitions control noise?

5. Indoor air quality

- 5.1 Are there problems or complaints about temperature, draughts, odours or lack of fresh air?
 - 5.1.1 Do staff suffer from dry, irritated eyes at the end of the day?
 - 5.1.2 Does the office seem stuffy?
 - 5.1.3 Do staff find the temperature cold, hot or fluctuating?
 - 5.1.4 Is there adequate ventilation for photocopiers?

6. Office layout

- 6.1 Is there sufficient space for tasks to be carried out?
 - 6.1.1 Is there sufficient space for the equipment and the operator?
- 6.2 Is there sufficient space for walkways through an area?
 - 6.2.1 Is there sufficient space for light, intermediate and busy foot traffic?
 - 6.2.2 Is there sufficient circulation space around each workstation?
- 6.3 Are there separate areas for tasks that require dedicated space?
 - 6.3.1 Is there a separate area for photocopying?

7. Workstations

- 7.1 Are workstations adequately designed for the tasks being performed?
 - 7.1.1 Is there sufficient space at the workstation for documents to be spread out within easy reach?
 - 7.1.2 Is there easy access to equipment such as a telephone and keyboard?
 - 7.1.3 Is there adequate and safe height adjustability of work surfaces?

7.1.4 Are workstations and equipment set up to reduce awkward postures?

- 7.2 Are the desks suitable for the tasks to be performed?
- 7.3 Do standing workstations meet the needs of the users?
 - 7.3.1 Are standing workstations suitable for a range of users?
 - 7.3.2 Is there sufficient width and depth for the tasks being carried out?
 - 7.3.3 Is there provision for sitting at this workstation where short periods of continuous work are required?
- 7.4 Is there suitable seating provided at a standing workstation?
 - 7.4.1 Are the chairs stable in access and egress?
 - 7.4.2 Are the chairs adjustable for different users?
- 7.5 Are the visitors' chairs adequate for the number and type of visitors?
 - 7.5.1 Do these chairs need to be hardy or soft and comfortable?
- 7.6 Are the reception chairs suitable for the tasks that need to be carried out?
 - 7.6.1 Are the reception chairs adjustable from the seated position?
 - 7.6.2 Are the reception chairs used by multiple operators?
- 7.7 Do the keyboard operator chairs provide support and comfort to all individual operators?
 - 7.7.1 Are these chairs adjustable in height and back rest height and angle from the seated position?
- 7.8 Do the executive chairs provide adequate support during the performance of all tasks?
 - 7.8.1 What degree of adjustability is provided by the existing chairs?

7.8.2 What degree of adjustability for individual fit is required?

7.9 Is there a need for foot rests?

7.9.1 Which operators require foot rests?

7.10 Are document holders provided? 7.10.1 What range of document holders should be tried to meet the needs of the different users?

7.11 Are staff trained to adjust their workstation and chair?

8. Storage

8.1 Is there sufficient general storage space for the office?

8.1.1 Is there sufficient storage space at each workstation?

8.1.2 Is storage space suitably designed to be within easy reach (that is, between shoulder and mid-thigh height)?

8.1.3 Is there sufficient space around storage areas to enable easy and safe access?

9. Hand tools

9.1 Are suitable, safe and adequate hand tools supplied for the work required?

9.1.1 Are sharp implements (such as staple removers) housed or stored so as to minimise the risk of injury?

10. Visual display units

10.1 Is the computer adequate for the task being performed?

10.1.1 Is the force required to press the keys too high or too light?

10.1.2 Is there adjustability for the screen brightness?

10.1.3 Is there adjustability of the screen height?

10.1.4 Is there a keyboard rest that frees up desk space for other tasks?

11. Radiation

11.1 Are old or deteriorated VDUs being used?

11.1.1 Have radiation emissions from old VDUs been tested within the last 12 months?

11.1.2 Are staff located closer than 1 metre from a VDU in any direction?

11.2 What policies and procedures exist for the placement of VDUs?

11.3 Are staff located near multiple electrical cords or computer cables?

11.3.1 Are electrical and computer cables unhoused or entwined?

12. Copying equipment

12.1 Is there adequate copying equipment, in good working order, for the work required?

12.1.1 Are copier lids intact and functioning to reduce exposure to intense light?

12.1.2 Is the copier functioning quietly and as quickly as indicated in the specifications for the equipment?

12.1.3 Are self-contained toner cartridges supplied in a sealed state?

12.2 Are procedures for the use and maintenance of copying equipment adequate, in place and in use?

12.2.1 How frequently are safety procedures reviewed?

13. Hazardous substances

13.1 Is there concern regarding hazardous substances such as paint, glues and new carpet?

13.1.1 Have hazards been identified, quantified and controlled?

13.1.2 Are there noticeable fumes in the air?

13.1.3 Do any work processes use or generate dust, smoke, fumes or gases?

13.1.4 Are there any hazards in the office known to be toxic, corrosive, inflammable or explosive?

13.1.5 Are MSDS and written safe work procedures readily accessible?

13.2 Are there adequate ventilation and housekeeping practices?

13.2.1 Has appropriate training been provided to all staff?

14. Housekeeping

14.1 Are the floors of all offices and passageways, corridors, storerooms or stairways: – kept free from obstruction – properly maintained – covered with non-slip material – adequately illuminated?

14.2 Are staircases provided with a substantial handrail or handhold?

14.3 Are the surfaces of all car parks and pathways around the building kept free of potholes and other tripping hazards?

14.4 Does management ensure that all equipment is regularly maintained to manufacturers' specifications?

14.5 Has management developed a system for immediately fixing faulty equipment?

14.6 Are all filing cabinets, cupboards, stable – for example, attached to the wall or floor to prevent them falling over?

14.6.1 Are they fitted with locking devices to prevent opening of more than one drawer at a time to stop them from falling over?

14.6.2 Are they sufficient for the needs of the office?

14.6.3 Are they located clear of doors, corridors and frequently used passages?

14.7 Are sharp corners of furniture and other fittings situated so as to avoid a hazard to people passing them?

15. Electrical Connections

15.1 Is the use of power boards or extension cords minimised?

15.2 Are electrical cords and connections inspected regularly?

15.2.1 Are all cords in as-new condition?

15.3 Are all appliances in use suitable and in good condition?

Appendix B
Jefferson County Public Schools
Grade Level Proficiency Expectations for Technology
Keyboarding

Students will become familiar with the keyboard

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
	Distinguish left and right hand side of the keyboard and use proper hands	Distinguish left and right hand side of the keyboard and use proper hands	Distinguish left and right hand side of the keyboard and use proper hands	Use correct finger placement on alphabet keys	Keyboard at 12-15 wpm with correct fingering positions on alphabet keys	Keyboard at 15-20 wpm with correct fingering positions on alphabet keys
Use special function keys including return, space bar and shift	Use special function keys including return, space bar, shift and command	Use special function keys	Use special function keys	Use special function keys	Use special function keys	Use special function keys
		Use correct body position	Use correct body position	Use correct body position	Use correct body position	Use correct body position
Keyboard alphabetic and numeric entry on keyboard	Keyboard alphabetic and numeric entry using keyboard and numeric pad	Keyboard alphabetic and numeric entry using keyboard and numeric pad	Keyboard alphabetic and numeric entry using keyboard and numeric pad	Keyboard alphabetic and numeric entry using keyboard and numeric pad	Keyboard alphabetic and numeric entry using keyboard and numeric pad	Keyboard alphabetic and numeric entry using keyboard and numeric pad
				Introduce and use proper keyboarding skills	Use proper keyboarding skills	Use proper keyboarding skills

1993 National Office Skills Modulesⁱ

Appendix C

National Module	No Prerequisite	Prerequisite Required	Corequisite Required
NOS 118 Data Operations	✓		
NOS116 Keyboard Techniques & Operation	✓		
NOS143 Data Operations	✓		
NOS 211 Keyboarding Speed & Accuracy		NOS116	
NOS 305 Text Production		NOS116 and NOS211	
NOS214 Word Processing for Operators		NOS116, NOS118 or NOS143	NOS211
NOS213 Computer Operations		NOS118 or NOS143	
NOS304 Word Processing – Advanced Operators		NOS211and NOS214	

ⁱ Australian Committee for Training Curriculum. (1993) *National Office Skills Modules*. ACTRAC Products Ltd.

Appendix D: Matrix of Documentation

First Published	Research, Curricula and Policy Documents	Refer to keyboarding	Refer to touch keyboarding	Health risk identified
1993	Australian Committee for Training Curriculum. (1993) <i>National Office Skills Modules</i> . ACTRAC Products Ltd.	✓	✓	✓
1994	Standards Council of Australia. SAA HB59—1994 Handbook Ergonomics—The Human Factor A practical approach to work systems design Standards Australia	✓		✓
1996	Guidance Note for the Prevention of Occupational Overuse Syndrome in Keyboard Employment (NOHSC:3005 (1996)) National Occupational Health and Safety Commission, Worksafe Australia	✓		✓
1996	Meredyth, D et al Real Time Computers, Change and Schooling 1999 J S McMillan Printing Group	✓		
1997	Ministerial Advisory Council on the Quality of Teaching 1997 Computer Proficiency for Teachers	✓		✓
1997	New South Wales Department of Education and Training Computer-based technologies in the primary KLAs (p115) 1997 Curriculum Support Directorate	✓	✓	
2001	NSW Board of Studies. (2001). <i>Curriculum Framework Stage 6</i> .	✓		✓
2002	Commonwealth Department of Education Science and Training. (2002). <i>Raising the Standards</i> . A proposal for the development of an ICT competency framework for teachers.			

First Published	Research, Curricula and Policy Documents	Refer to keyboarding	Refer to touch keyboarding	Health risk identified
2002	K-10 Curriculum Information and Technology Software Years 7-10 Draft Brief 2002			
2002	New South Wales Board of Studies 2002 Trial Computing Skills Test Year 10	✓		
2002	New South Wales Department of Education and Training 2002 Computer Skills Assessment Year 6	✓		
2003	Statistics: The University of Newcastle, Australia http://www.newcastle.edu.au/our-uni/facts.html	✓		
2004	Comcare Australia. (2004). <i>A hazard identification checklist</i> . Accessed 19 May 2004, from http://www.comcare.gov.au/publications/officewise/officewise.pdf Canberra: Commonwealth of Australia.	✓		✓
2004	NSW Legislative Assembly Education Amendment (Computing Skills) Bill 2003 NSW Hansard Articles:LA:05/09/2004:#7			

Appendix E

Appendix F: Analysis of Student Keyboarding Texts

First Published	Title of Student Text	Parts of the Keyboard	Ergonomic Diagram	Posture Diagram	Keyboard Layout Diagrams	Exercises and Review	OH&S and Exercises
1946	Pitmans College. (1962). <i>Teach Yourself Typewriting</i> . The English Universities Press Ltd.	✓			✓	✓	
1963	Napper, D., Craig, D. and Whyte, C. (1987). <i>Practical Typewriting for Information Processing</i> . (p18) 7th Edition Pitman Publishing.	✓	✓	✓	✓	✓	
1969	Napper, D. and Whyte, C. (1969). <i>Practical Typewriting</i> . Australia: Sir Isaac Pitman (Aust) Pty Ltd	✓	✓	✓	✓	✓	
1982	Napper, D. and Craig, D. (1990). <i>Keyboarding</i> (p14) 3 rd Edition. Australia: Longman Australia Pty Limited	✓	✓	✓	✓	✓	
1989	Byrne, R. (1989). <i>Fastkeys, a quick keyboarding course</i> 1989 Pitman Publishing	✓	✓	✓	✓	✓	✓
1993	Clissold, H. (1993). <i>Get Started with Keyboarding and Word Processing</i> . Australia: Thomas Nelson	✓			✓	✓	
2002	Alderman, L. (2002). <i>Keyboarding Plus Handbook</i> . Sydney: Horwitz Martin Education	✓	✓	✓	✓	✓	

Appendix G: Analysis of Keyboarding Teacher Texts

First Published	Title of Teacher Text	Principles of Learning	Analysis of the Skill	Content Material	Classroom Methodology	Teaching Keyboarding	Grading
1932	Haefner, R. (1932). <i>The Typewriter in the Primary and Intermediate Grades</i> . USA: The Macmillan Company.	✓	✓	✓	✓	✓	✓
1964	McNicol, G. (1968). <i>Teaching Shorthand and Typewriting</i> . Second Edition Pitman.	✓	✓	✓	✓	✓	✓
1969	West, L. J. (1969). <i>Acquisition of Typewriting Skills</i> . Pitman Publishing Corporation.	✓	✓	✓	✓	✓	✓
1978	McLean, G. N. (1994). <i>Teaching Keyboarding</i> . 3 rd Edition Delta Pi Epsilon.	✓	✓	✓	✓	✓	✓
1978	Mackay, E. and Williams G. M. (1978). <i>The Typewriting Dictionary</i> . Singapore: Kyodo-Shing Loong Printing Industries Pte Ltd.	✓	✓	✓	✓	✓	✓
1979	Robinson, J. W. et al. (1979). <i>Typewriting: Learning and Instruction</i> . USA: South-Western Publishing Co.	✓	✓	✓	✓	✓	✓

Appendix H

From Rhetoric to practice

Issues in teaching and learning "touch" keyboarding

- 1 Which institution and year do you currently teach? Primary Secondary Tertiary
- (Please circle one or more) K 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4

The following questions relate to current practices in learning keyboarding in your institution

- 2 Do your students use a computer keyboard for course related activities? (Please circle one) Yes No
- 3 What is the average amount of time your students spend on a computer keyboard each week? Hours: Minutes:
- 4 Please indicate the type of keyboard work your students are expected to perform in relation to your course?
- 5 Are students in your institution proficient at touch keyboarding and at what level? Yes No
- (Please circle one) High proficiency Medium proficiency Low proficiency
- 6 In your institution, what support is available for students to improve their hand writing skills?
- 7 In your institution, what support is available for students to improve their keyboarding skills?
- 8 When do you feel keyboarding should be introduced to students? Primary Secondary Tertiary
- (Please circle one or more) K 1 2 3 4 5 6 7 8 9 10 11 12 1 2 3 4

The following questions relate to current practices in teaching keyboarding in educational institutions

- 9 Are you proficient at touch keyboarding and at what level? Yes No
- (Please circle one) High proficiency Medium proficiency Low proficiency
- 9 How do teachers learn how to teach keyboarding?
- 10 How much time do you spend on a computer keyboard each week? Hours: Minutes:
- 11 In your institution, what support is available for teachers to improve their keyboarding skills?
- 12 In your institution, what resources are available for teachers to teach keyboarding skills?
- 13 Please indicate the type of keyboard work you are expected to perform in relation to your teaching?
- Email Teaching resources Others
- Spreadsheets Internet access
- Report writing Word Processing

The following questions relate to "touch" keyboarding and is it preferable to "hunt and peck" keyboarding?

- | | | | | |
|----|---|----------------------|------------------------------|-------|
| 14 | What method of keyboarding do you use? | touch
keyboarding | hunt and peck
keyboarding | other |
| 15 | How many years have you been using this method? | | years | |
| 16 | What are the Occupational Health & Safety concerns with relation to students using the "hunt and peck" method of keyboarding? | | | |
| 17 | What are the advantages of using the "hunt and peck" keyboarding method? | | | |
| 18 | What are the disadvantages of using the "hunt and peck" keyboarding method? | | | |
| 19 | Are there any Occupational Health & Safety concerns with relation to students using the touch keyboarding method? | | | |
| 20 | What are the advantages of using the touch keyboarding method? | | | |
| 21 | What are the disadvantages of using the touch keyboarding method? | | | |

What are the issues in teaching and learning "touch" keyboarding?

22 What are the difficulties in learning to touch keyboard?

23 What are the difficulties in teaching touch keyboarding?

24 Are the resources available adequate? (Please circle one) Yes No

25 If no, what further resources do you need?

26 Would you like to change your current method of keyboarding? (Please circle one) Yes No

27 Why would you like to change your current method of keyboarding?

28 What is the negative learning impact in wanting to change methods of keyboarding?

29 Who do you feel should be responsible to deliver touch keyboarding programs to your students?

29 Any further comments:

Appendix I

The Principal

Dear Principal

**Information Statement for the Research Project:
Rhetoric to practice – issues in teaching and learning touch keyboarding**

Research Team: Dr John Schiller, Project Supervisor

Student Researcher: Mrs Gwendolyn Alderman

Teachers from your School are invited to take part in the research project identified above. Mrs Gwendolyn Alderman is conducting the research as part of her Master of Education degree under the supervision of Dr John Schiller from the School of Education at The University of Newcastle.

The purpose of the project is to identify the issues in teaching and learning touch keyboarding in educational institutions. There is no current evidence available of how lecturers, teachers and students acquire touch keyboarding skills nor is there any analysis of using the “hunt and peck” method of keyboarding by young people.

To determine teacher’s views of the importance of keyboarding, ten teachers from a primary, secondary and tertiary institution will be invited to participate in a 20 minute interview with a set list of questions. This interview may be conducted face-to-face or by telephone with the researcher.

Participation - The invitation to participate is entirely the school’s choice. Individual teachers are free to choose whether or not they participate. During the project, either a school or an individual may withdraw from the project without having to give a reason. As several institutions are involved the withdrawal of any one institution or person will not jeopardise the overall success of the project.

Privacy – Teacher names will be placed on interview question sheets throughout the project. These data will be kept in a locked cabinet at the Researcher’s home. At the end of the project teacher names will be replaced by a numerical code. All teacher names and school details will remain confidential to the researchers and will not be included in any reports arising from this study.

Interview Timetable – Face-to-face or telephone interviews may be conducted at a time to suit the teacher during Term 1, 2003.

Data collected – the information collected will form part of a thesis by the student researcher and will be presented in a peer reviewed journal to share the outcomes with other educators. A report will be presented to the Schools, the University of Newcastle Ethics Committee and the Department of Education and Training Strategic Research Directorate.

Dr John Schiller
Project Supervisor
School of Education
Faculty of Education and Arts
The University of Newcastle
Callaghan NSW 2308
Tel: 4921 6603
Fax: 4921 6895
John.Schiller@newcastle.edu.au

If you are interested in participating in this project please complete the attached Consent Form and return it using the attached prepaid return envelope.

Should your School choose to participate in this study, please nominate ten teachers to participate in the interview. In order to minimise any costs to your School, complete sets of documentation and envelopes are attached.

Please find attached the following documents:

- School Principal's Consent Form and prepaid return envelope
- Information Statement and Consent Form for Teachers
- Prepaid return envelope for Teacher Consent Forms

Could you please distribute information to the 'nominated' teachers?

If you would like to clarify anything concerning this study please contact either Mrs Alderman or myself. Thank you for considering your School's participation in this study.

Yours sincerely

Yours sincerely

Dr John Schiller
School of Education
University of Newcastle

Mrs Gwendolyn Alderman
School of Education
University of Newcastle
4963 3242 or 0417 417 598
Email: lyn.alderman@newcastle.edu.au

Complaints

This project has been approved by the University's Human Research Ethics Committee, Approval No. H-513-0203 and the Department of Education and Training Strategic Research Directorate Approval No. [insert approval number when known].

Dr John Schiller
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The University of Newcastle
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Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to the

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Version 3:22/01/03

Head of School

Dear

Information Statement for the Research Project:
Rhetoric to practice – issues in teaching and learning touch keyboarding
Research Team: Dr John Schiller, Project Supervisor
Student Researcher: Mrs Gwendolyn Alderman

Lecturers from your School are invited to take part in the research project identified above. Mrs Gwendolyn Alderman is conducting the research as part of her Master of Education degree under the supervision of Dr John Schiller from the School of Education at The University of Newcastle.

The purpose of the project is to identify the issues in teaching and learning touch keyboarding in educational institutions. There is no current evidence available of how lecturers, teachers and students acquire touch keyboarding skills nor is there any analysis of using the “hunt and peck” method of keyboarding by young people.

To determine lecturer’s views of the importance of keyboarding, ten lecturers from a tertiary institution will be invited to participate in a 20 minute interview with a set list of questions. This interview may be conducted face-to-face or by telephone with the researcher.

Participation - The invitation to participate is entirely the school’s choice. Individual lecturers are free to choose whether or not they participate. During the project, either a school or an individual may withdraw from the project without having to give a reason. As several institutions are involved the withdrawal of any one institution or person will not jeopardise the overall success of the project.

Privacy – Teacher names will be placed on interview question sheets throughout the project. These data will be kept in a locked cabinet at the Researcher’s home. At the end of the project teacher names will be replaced by a numerical code. All teacher names and school details will remain confidential to the researchers and will not be included in any reports arising from this study.

Interview Timetable – Face-to-face or telephone interviews may be conducted at a time to suit the teacher during Term 1, 2003.

Data collected – the information collected will form part of a thesis by the student researcher and will be presented in a peer reviewed journal to share the outcomes with other educators. A report will be presented to the Schools, the University of Newcastle Ethics Committee and the Department of Education and Training Strategic Research Directorate.

If you are interested in participating in this project please complete the attached Consent Form and return it using the internal return envelope.

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John.Schiller@newcastle.edu.au

Should your School choose to participate in this study, please nominate ten lecturers to participate in the interview. In order to minimise any costs to your School, complete sets of documentation and envelopes are attached.

Please find attached the following documents:

- Head of School's Consent Form and internal return envelope
- Information Statement and Consent Form for Lecturers
- Internal return envelope for Lecturer Consent Forms

Could you please distribute information to the 'nominated' lecturers?

If you would like to clarify anything concerning this study please contact either Mrs Alderman or myself. Thank you for considering your School's participation in this study.

Yours sincerely

Yours sincerely

Dr John Schiller
School of Education
University of Newcastle

Mrs Gwendolyn Alderman
School of Education
University of Newcastle
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Email: lyn.alderman@newcastle.edu.au

Complaints

This project has been approved by the University's Human Research Ethics Committee, Approval No. H-513-0203 and the Department of Education and Training Strategic Research Directorate Approval No. [insert approval number when known].

Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to the

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Version 3:19/02/03

**Research Project: Rhetoric to practice –
issues in teaching and learning touch keyboarding**
Research Team: Dr John Schiller, Project Supervisor
Student Researcher: Mrs Gwendolyn Alderman

TEACHER'S CONSENT FORM

I _____ agree to participate in the above research project
and give my consent freely.

I understand that the project will be conducted as described in the *Information Statement*, a copy of
which I have retained.

I understand I can withdraw from the project at any time and do not have to give any reason for
withdrawing.

I consent to:

- A 20 minute interview with a set list of questions

I understand that my personal information will remain confidential to the researchers.

I have the opportunity to have questions answered to my satisfaction.

Print Name: _____

Signature: _____ Date: _____

Please return this Consent Form to your school office in the Confidential Envelope attached.

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Version 3:19/02/03

**Research Project: Rhetoric to practice –
issues in teaching and learning touch keyboarding**
Research Team: Dr John Schiller, Project Supervisor
Student Researcher: Mrs Gwendolyn Alderman

SCHOOL PRINCIPAL'S CONSENT FORM

I _____ agree for _____
school to participate in the above research project and give my consent freely.

I understand that the project will be conducted as described in the *Information Statement*, a copy of which I have retained.

I understand I can withdraw the school from the project at any time and do not have to give any reason for withdrawing.

I consent to:

- Allow my school to participate in this project.

I understand that the personal information of all students and teachers will remain confidential to the researchers.

I have the opportunity to have questions answered to my satisfaction.

Print Name: _____

Signature: _____ Date: _____

Please return this Consent Form to the researchers in the Confidential Envelope attached.

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Version 3:19/02/03

**Research Project: Rhetoric to practice –
issues in teaching and learning touch keyboarding**
Research Team: Dr John Schiller, Project Supervisor
Student Researcher: Mrs Gwendolyn Alderman

LECTURER'S CONSENT FORM

I _____ agree to participate in the above research project
and give my consent freely.

I understand that the project will be conducted as described in the *Information Statement*, a copy of
which I have retained.

I understand I can withdraw from the project at any time and do not have to give any reason for
withdrawing.

I consent to:

- A 20 minute interview with a set list of questions

I understand that my personal information will remain confidential to the researchers.

I have the opportunity to have questions answered to my satisfaction.

Print Name: _____

Signature: _____ Date: _____

*Please return this Consent Form to the researchers in the Confidential Envelope attached using the
University mail service.*

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Version 3:19/02/03

**Research Project: Rhetoric to practice –
issues in teaching and learning touch keyboarding**
Research Team: Dr John Schiller, Project Supervisor
Student Researcher: Mrs Gwendolyn Alderman

HEAD OF SCHOOL'S CONSENT FORM

I _____ agree for the School of Education, Faculty of Education and Arts, University of Newcastle to participate in the above research project and give my consent freely.

I understand that the project will be conducted as described in the *Information Statement*, a copy of which I have retained.

I understand I can withdraw the school from the project at any time and do not have to give any reason for withdrawing.

I consent to:

- Allow my school to participate in this project.

I understand that the personal information of all students and teachers will remain confidential to the researchers.

I have the opportunity to have questions answered to my satisfaction.

Print Name: _____

Signature: _____ Date: _____

Please return this Consent Form to the researchers in the Confidential Envelope attached using the University mail service.

Appendix J

UoN Summer School Bridging Course

Every summer the UoN conducts a bridging program for students entering the Open Foundation access program and for undergraduates. The researcher designed the program and has delivered it for the last five years. The format of the program is:

- ❑ Introduction to Touch Keyboarding
- ❑ File Management
- ❑ Word Processing
- ❑ Presentation Software
- ❑ Internet access and Email

The program is conducted over 9 sessions with each session lasting for 2 hours (18 hours) over a two week period. This enables students to spend one hour per session on learning how to keyboard and the other hour on how to operate a computer within the University environment.

Students are tested for speed and accuracy of the keyboarding skills in the first and last session of the bridging program using the Australian Standard AS2708 test.

Appendix K

Touch Keyboarding Attendance Sheet

School:
Student code:
Year:
Age:

1. Are you able to move all of your fingers independently?
2. Do you have any recent injuries, for example back, neck, wrist or hands?
3. Do you have any previous experience using a computer keyboard?
4. How many years have you been using a computer keyboard?

Session	Attendance	Date
Session 1:		
Session 2:		
Session 3:		
Session 4:		
Session 5:		
Session 6:		
Session 7:		
Session 8:		
Session 9:		
Session 10:		
Session 11:		
Session 12:		
Pre-test result:		
Post-test result:		

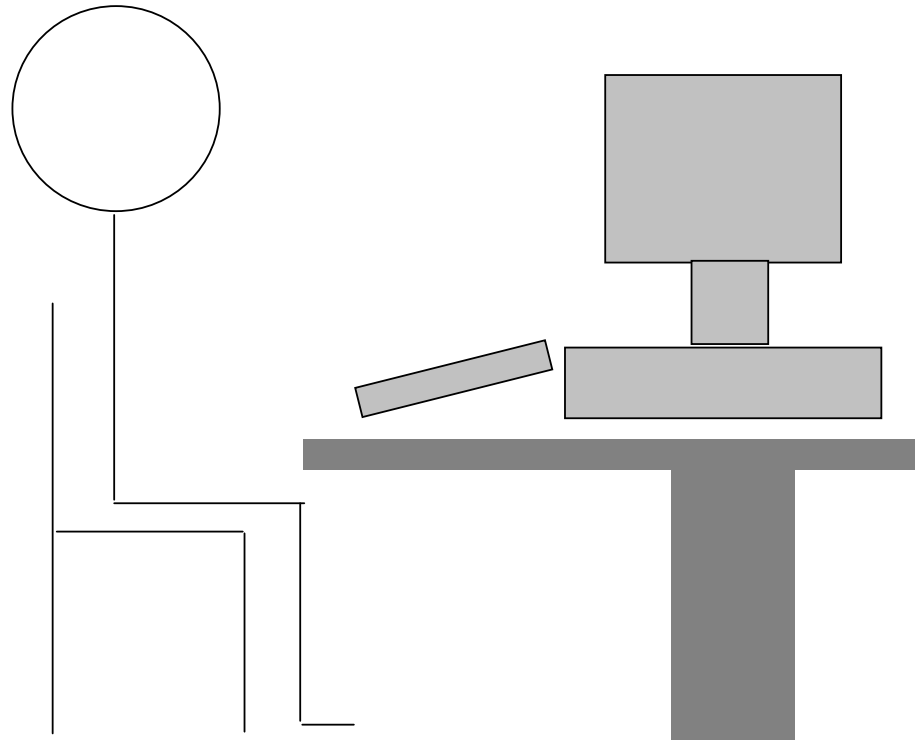
Appendix L

Observation Sheet & Frequency Diagram

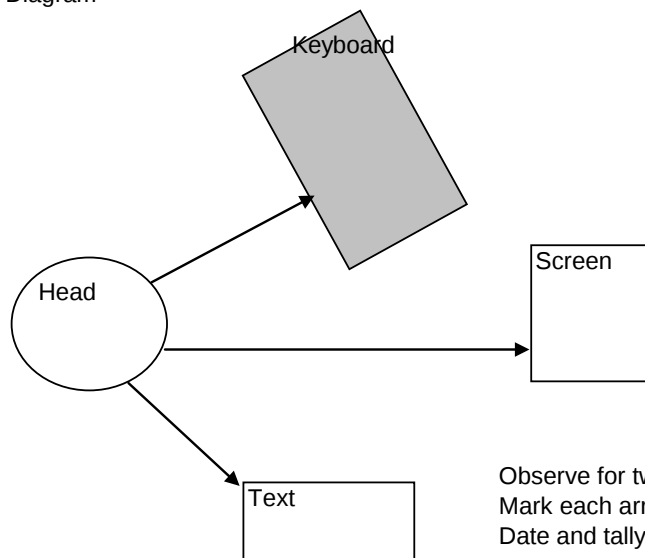
Student Name:

Student Code:

Draw the arm, wrist and hand positions



Frequency Diagram



Observe for two minutes
Mark each arrow once for every movement
Date and tally marks

Appendix M

Student Name:

Observer:

Date:

Student code:

Pre-test

Post-test

A. body Position	Y	N	NA	Comments
1 Head is directly over shoulders				
2 Shoulders are relaxed				
3 Elbows are at 90° angle resting comfortably at side				
4 Wrists are straight, floating over wrist rest				
5 Knees are at 90° angle or greater				
6 Feet flat on floor or supported by footrest				
B. Workstation	Y	N	NA	Comments
1 Work surface area is adequate for computer and materials				
2 Keyboard and mouse are directly in front of the operator				
3 Keyboard and mouse are at comfortable height				
4 Monitor is placed arm's length away from operator, either directly in front or slightly to				
5 Top of monitor screen is slightly below eye level				
6 Chair has adjustable height and seat back				
7 Seat back is adjusted to support lumbar region of back				
8 Document holders are used to position documents close to monitors				
C. Glare Reduction	Y	N	NA	Comments
1 Screen contrast and brightness are adjusted				
2 Screen is positioned away from or at right angles to windows				
3 Screen is tilted down slightly to reduce glare from overhead lighting				
4 Lamps and other lighting are positioned to minimize glaze				
5 Window coverings are adjusted to reduce glare from outside light				

Appendix N

Question 16 What are the Occupational Health and Safety concerns with relation to students using the “hunt and peck” method of keyboarding?

Institution	Question 16
Primary	Sight/Posture
Primary	Neck strain, finger damage.
Primary	Neck and back curved, no support for wrists and feet.
Primary	Sore finger tips, eye strain.
Primary	Bad posture, fatigued back, weak arms and hands.
Secondary	RSI, frustration.
Secondary	Crouched posture, no ergonomic furniture.
Secondary	RSI problems, frustration, slow.
Secondary	Don't know.
Secondary	RSI
Tertiary	Don't know.
Tertiary	Not good for the neck.
Tertiary	Posture, neck, shoulders, right fingers – RSI.
Tertiary	Eyesight and RSI.
Tertiary	Fatigue and RSI.

Question 20 What are the advantages of using the touch keyboarding method?

Institution	Question 20
Primary	Speed, least amount of problems.
Primary	Efficiency and proficiency.
Primary	Once mastered, speed and can focus on screen.
Primary	Speed and proficiency.
Primary	More proficient, speed and accuracy, body.
Secondary	Less time consuming, spelling, less frustration.
Secondary	Speed of input and output.
Secondary	Faster, easier.
Secondary	Faster.
Secondary	Speed.
Tertiary	Faster.
Tertiary	Speed, not distracting from content.
Tertiary	Faster work and less prejudice on process.
Tertiary	Speed and accuracy.
Tertiary	Speed and reduce fatigue.

Question 29 Who do you feel should be responsible to deliver touch keyboarding programs to your students?

Institution	Question 29
Primary	Class teacher support from policy and computer coordinator.
Primary	As a class teacher/ extra RFF – KLA time.
Primary	Person in working in the computer room with program.
Primary	Computer expert of every teacher in classroom.
Primary	Classroom teacher/RFF teacher.
Secondary	Parents and teachers.
Secondary	Teachers with training – TAFE secretarial, upskilled.
Secondary	Department of Schools
Secondary	People with suitable expertise.
Secondary	Trained teachers.
Tertiary	Hope to come with skills from school – Learning Skills Unit.
Tertiary	there should be dedicated teachers of keyboarding employed by the University.
Tertiary	any touch keyboarding excellence and keyboard experts.
Tertiary	Support staff – specially trained like TAFE, import a course and teacher.
Tertiary	Appropriate qualifications.

Appendix O

Test 1

Recreational fishing is, and always has been, a popular sport, and is carried out all over the world by men, women and children of varying ages.

Regardless of the conditions, the fish always beckon. If a lake is frozen over, a fisherman or woman will break a hole in the ice to catch that unsuspecting fish, or, if it is extremely hot and the mosquitoes are biting, you will see people putting up with these conditions trying to catch a fish.

There are many theories about the best time to catch a fish. One is that the phases of the tide and the moon dictate the best time to go fishing.

However, it seems that just when you have it all worked out as to the best time to go, suddenly you will catch a stack of fish on the worst moon phase possible.

There will be many people with differing opinions but ‘expects’ tell us that the moon and tide can have some bearing on your catch. Different fish seem more plentiful at different times. The shrewd fisherman or woman will learn the habits of the fish and know the phases of the moon or whether the tide is ebbing or at flood when these fish are plentiful.

Like most things, fishing success will be attained with the right preparation. The right tackle and bait must be prepared to do the job properly because catching a fish is no accident. With skill and patience and paying a little attention to the moon and the tides, we are told, this will maximise the catch in relation to the effort you put into it.

Test 2

The advertisements on television that show delicious food being prepared or eaten do encourage us to travel down to the local shopping centre and buy the advertised product. Many of these advertisements make extravagant claims such as if we eat particular foods it will change or whole lives! This is probably a valid claim because, in some circumstances, if we eat less sugar and fats we will possibly lose weight. This, in turn, may make us more energetic and decide to take up a sport. This could change your life!

Most of us eat more than we should and never learn the lesson that it is only necessary to match our food to our body's requirements. We seem to do the exact opposite. For example, if we spend all day sitting about, maybe reading a book, we use up little energy, but, even so, we will probably have three square meals as well as morning and afternoon tea. Conversely, if we are extremely busy, we rush around and give little thought to food. But it is in our busiest days, when we are burning up energy, that we should really ensure that our food intake is adequate.

The image that is projected by the media is that we should all be slim but it is a fact of life that our bone structure usually dictates our size. To live up to the image that society portrays, many of us make a desperate attempt to lose weight by going on a crash diet and expect stunning results in a matter of days or weeks. It does not happen that way. To maintain a weight loss, eating habits have to permanently change, otherwise, as soon as you go off the diet, the weight will return.