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Post-Graduate Diploma in Training and Education

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Literature Review

'The Psychology of Touch-Typing Methods and Future Trends'

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Abstract

Typing is a skill that is learned using a variety of senses, but most notably vision and touch. A number of studies into the area of sensorimotor coordination relating to touch-typing are reviewed. In an attempt to quantify and determine the psychology surrounding the skill of touch-typing and its teaching methods, this paper examines relevant literature in this field, and whether there is further room for improvement. Relating to personal experience in the field of touch-typing and audio transcription, it is hoped to draw conclusions as to the future of such skills in the modern day education and employment environment. Particular attention is paid to students with learning difficulties and physical limitations. Often an overlooked talent, the ability to touch-type at a reasonable speed is still a valuable asset and should remain so for a few more years until technical advancements force the keyboard into history as a collector's item.

Introduction

Until advancements in voice-recognition will allow users to talk and dictate efficiently and expediently to their computers, touch-typing remains a valuable skill in many areas of employment and education. Even transcribing spoken word to a text processor involves a high level of manual and visual dexterity. Touch-typing predominantly uses sensory inputs of vision and touch, although other factors such as lighting and posture are important. A typist must concentrate on three sources of information – the monitor, the keyboard, and the original text/copy. The monitor is only viewed occasionally. Proficiency is achieved when only the latter is in full vision. Touch-typing means *'not looking at the keyboard'* or using the *'hunt-and-peck'* method of locating keys with fingers.

The QWERTY keyboard was designed by Christopher Latham Scholes in 1868, but its keyboard layout was devised not to aid the user, but to stop the hammer and platen mechanism from jamming. Therefore the student typist must learn the keyboard outwardly from the home rows (A to semicolon) assigning appropriate letters to the corresponding finger. The small ridges on the F and J keys indicate where the typist should position their index fingers, and hover over the companion letters (i.e. for the letter F – R, T, G, V). Using mnemonics or word-key association are helpful learning methods therefore, and especially important is eye-hand co-ordination.

The sensorimotor reflexes touch and vision are vitally important for the learner typist to build up speed and avoid transcription and spelling errors.

Touch-typing can be self-taught, by using online tutors, and in a classroom environment but the psychology is the same for all learning methods. Particularly for the latter there are many research articles and studies which attempt to explore the art of touch-typing.

Findings

The importance of vision in tune with kinaesthetic activity was researched by Tapp & Logan (2011) where they surmised that typists become slower when their view of the keyboard is covered with a cardboard box. They were testing the hypothesis that typists slow their typing rate in order to confirm which key is struck (Tapp & Logan, 2011). Vision is important but so is bodily-kinaesthetics in order to effectively touch-type.

Learning the keyboard involves memorising each key for each finger and a typical method of key-association is colour coding. Rieger (2004) tested the hypothesis that typists compared to non-typists were able to show better results when colour codes were employed. Her findings from four different experiments concluded that an automatic activation process coupled with spatial representations contribute to high performance levels in skilled typists (Rieger, 2004).

Johansson *et al.* (2010) conducted typing experiments using eye-tracking technology and keyboard-logging software to compare various levels of typing proficiency.

Although not incorporating a hard-copy to type from, and rather using the monitor as the text output device, they compared *'monitor gazers'* (i.e. touch-typists) to *'keyboard gazers'* (non-typists), and found that the latter group were much slower with text production, confirming that looking at the keyboard hinders speed and accuracy. Similar in-depth research was undertaken by Logan (2003) who developed a method of using a spatial-compatibility effect called the Simon Effect. This worked on the theory that a number of key press schemata and movement schemata are active simultaneously (Logan, 2003).

A comprehensive study of typing was published by Rumelhart and Norman (1982) using computer simulation models. They investigated various patterns of text production and typing methods, and concluded skilled motor coordination enhanced typing skills. This was measured on the activation-trigger-schema (Rumelhart & Norman, 1982).

Measuring the linguistic structure of sentence construction, Shulansky and Herrman (1977) concluded that even skilled touch-typists can be affected by language processing. They maintain that non-typists have a encoding and decoding process to contend with compared to proficient typists (Shulansky & Herrman, 1977). Another study, although based on a Japanese keyboard, incorporated a T-code system for evaluating a cognitive model for training and measuring typing speed (Ono, 1990). The execution time of a physical or cognitive task is known as a Power Law.

Studies have also been conducted into physical limitations to typing, for example, one-handed touch-typing. Matias *et al.* (1996) measured skills of various typists

using just one hand to control the entire keyboard. This would be especially of benefit to those who have a disability, or those who are wishing to extend their mastery of the computer keyboard. The authors emphasise however that further research into this area is needed since more pauses are needed by the typist so as not to cause repetitive strain injury (Matias *et al.*, 1996). Similar studies have concluded that training one hand in typing results in transfer of training to the other hand. One such study was by Hicks *et al.* (1982) where participants were restrained and then measured as to their manual dexterity; resulting in the conclusion that motor programming overflows from one loci (place) to another (Hicks *et al.*, 1982).

Many studies have been conducted on mentally handicapped children and adults, including an important early study by Karnes *et al.* (1964). Although this may seem outdated many of their conclusions still hold true today, and their methods appeared to help at least a quarter of such students.

Christensen (2004) is one of many researchers who have examined the skill levels attained with touch-typing to those of handwriting. She sampled 276 students to gather data on comparative scores with handwriting and typing by measuring orthographic-motor integration against automaticity i.e. with lower levels students do not have sufficient cognitive resources to concentrate on other tasks such as writing composition (Christensen, 2004).

Another disability studied was visual impairment by Douglas and Long (2003). This concentrated on the strategies and implications for learners with visual impairment using a computer keyboard. In these experiments the participants could choose the

font size of the text copy but the environment around the workstation was predominantly assessed. The study included posture, the use of the equipment and how the participant positioned the document on the desk.

Ripat *et al.* (2010) studied ergonomic keyboards used by typists with limited use of their upper-body. Here also posture was important but the researchers concluded there was little or no improvement in typing skill or speed, but that it just takes a short while to adjust to the slightly different layout of an ergonomic keyboard.

Discussion

In the area of educational psychology regarding touch-typing there is much research that dates back to the time when computer workstations became common in employment and education, and even further if one goes back to the typewriter and its use by office and secretarial staff. Researching the psychology of touch-typing spins off to many different tangents such as sensorimotor reflex, vision, posture, environment and teaching methods.

Relatively recent articles by Logan (2011) and Rieger (2004) amongst others examine the relationship between eye and hand coordination. Naturally sensorimotor reflexes are important when a typist has to concentrate with their eyes and hands using procedural memory. Rumelhart and Norman (1982) appear to be definitive contributors in regard to enhancing the proficiency of a student typist. Their study in 1982 outlined all aspects of the skill. Gordon Logan's (2003) Simon Type Effect proves to be an interesting way of measuring proficiency, but whether this method can be adopted in the classroom is dubious.

Some limitations and shortcomings in all the literature mainly centre around methods of teaching. Most studies were undertaken by skilled typists, and others used non-typists as a control group. Greater focus on those learning to type seemed lacking from research available. Since the psychology of touch-typing has a long history there mainly seems to be a repeat of various studies with limited conclusions. However, such research should not be disregarded and numerous teaching methods can be utilised in a classroom situation.

For the student to learn the keyboard several methods are available. Mnemonics can play a central role in remembering finger-key combinations, where for example, a student will remember a word or image associated with that particular letter of the alphabet in relation to the correct finger of the hand. There was a lack of research into this area. Rieger (2004) used colour-coding which is a useful method of associating home keys with their corresponding letters on the keyboard. Johansson *et al.* (2010) provided valuable research on typists compared to non-typists, and for the student avoiding having to look at the keyboard is essential to enhancing proficiency.

Inclusiveness in psychology in touch-typing is another area which garners much research, and improvements to the teaching methods applied to learners with physical difficulties are ongoing. For these learners, as Ripat *et al.* (2010) have demonstrated for example, ergonomics are an important aspect of touch-typing pedagogy. Posture is just as important as eye-hand coordination. Karnes *et al.* (1964) studies on educable mentally handicapped children applies also to adults with similar disabilities.

In an educational scenario teaching touch-typing to students of all levels and competencies requires sensorimotor reflexes working in unison, but where a student has limitations in one or more, special attention is required for such learners. Dyslexia and dysphasia are also conditions which have limited literature, and unless the student discloses such a condition, learning to touch-type can be an arduous task.

New research into dealing with various types of learning disabilities, both mental and physical is in demand. Although there are various support groups for these learners, it appears there is an inadequate lack of study into touch-typing for inclusive students.

Touch-typing requires motivation. Ericsson *et al.* (1993) outlined the constraints to resources, effort and motivation. Unless the student is prepared to endeavour through the hours of drills and practice to achieve a reasonable words per minute score then they will likely not succeed. More research into the motivational aspect of touch-typing is suggested. Many students also reach a plateau when learning to type, as if they are not progressing, but this phase is usually temporary and requires further concentration on speed or accuracy. Again, this might require further investigation.

Much depends on the future of touch-typing, especially as an educational module. Perhaps in only a few more years voice recognition will make the keyboard defunct, or at the very least, an optional extra. This opens up a new area for research in that changes in education and employment will revolutionary. Speech-to-text would not work in a classroom full of students because of noise levels. A situation would have to evolve similar to learning audio transcription where the user has a headset. Different pedagogies for touch-typing would be required, and also allow for a diverse range of learners.

Conclusion

Examining literature in relation to the psychology of touch-typing reveals extensive research into teaching methods and the sensorimotor reflexes employed by the learner typist. A wealth of information exists on cognitive-motor performance of typewriting ability. Perhaps more research can be initiated to delve deeper into the realms of educating learners with physical or mental disabilities. The skills involved in touch-typing include memory, spatial awareness, manual dexterity, practice, motivation and persistence. Whereas there appears not to be a right way of instructing a student to learn to type, many methods are employable.

For a student who is learning touch-typing, many improvements can be made to their learning experience, purely by looking at the psychology involved in learning the keyboard. Any typist will tell you of their satisfaction when they did not have to look at the keyboard anymore and that the key-finger co-ordination is now stored in long-term memory.

References

Alves, R, Castro, S, & Olive, T 2008, 'Execution and pauses in writing narratives: Processing time, cognitive effort and typing skill', *International Journal of Psychology*, 43, 6, pp. 969-979.

Buchanan, D, & Boddy, D 1982, 'Advanced technology and the quality of working life: The effects of word processing on video typists', *Journal Of Occupational Psychology*, 55, 1, pp. 1-11.

Christensen, CA 2004, 'Relationship between orthographic-motor integration and computer use for the production of creative and well-structured written text', *British Journal of Educational Psychology*, 74, 4, pp. 551-564.

Douglas, G, & Long, R 2003, 'An observation of adults with visual impairments carrying out copy-typing tasks', *Behaviour & Information Technology*, 22, 3.

Dryden, L 2007, 'Emergent typing', *English 4--11*, 31, pp. 15-18.

Hicks, R, Frank, J, & Kinsbourne, M 1982, 'The Locus of Bimanual Skill Transfer', *Journal Of General Psychology*, 107, 2, p. 277.

Horne, J, Ferrier, J, Singleton, C, & Read, C 2011, 'Computerised assessment of handwriting and typing speed', *Educational & Child Psychology*, 28, 2, pp. 52-66.

Johansson, R, Wengelin, Å, Johansson, V, & Holmqvist, K 2010, 'Looking at the keyboard or the monitor: relationship with text production processes', *Reading & Writing*, 23, 7, pp. 835-851.

Karnes, M, Clarizio, H, & Zehrbach, R 1964, 'The Effects of Typing Instruction on the Personality and Achievement of Educable Mentally Handicapped Children', *Exceptional Children*, 31, 1, pp. 27-32.

Logan, GD 2003, 'Simon-Type Effects: Chronometric Evidence for Keypress Schemata in Typewriting', *Journal of Experimental Psychology. Human Perception & Performance*, 29, 4, pp. 741-757.

Matias, E, MacKenzie, I, & Buxton, W 1996, 'One-Handed Touch Typing on a QWERTY keyboard', *Human-Computer Interaction*, 11, 1.

Rieger, M 2004, 'Automatic Keypress Activation in Skilled Typing', *Journal of Experimental Psychology. Human Perception & Performance*, 30, 3, pp. 555-565.

Ripat, J, Giesbrecht, E, Quanbury, A, & Kelso, S 2010, 'Effectiveness of an ergonomic keyboard for typists with work related upper extremity disorders: A follow-up study', *Work*, 37, 3, pp. 275-283.

Shulansky, J, & Herrmann, D 1977, 'The Influence of Linguistic Structure on Typing', *Language & Speech*, 20, 1, pp. 80-85.

Tapp, K, & Logan, G 2011, 'Attention to the hands disrupts skilled typewriting: The role of vision in producing the disruption', *Attention, Perception & Psychophysics*; Nov 2011, Vol. 73 Issue 8.