

Employees Cognitive Measurement By Typing Time

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Abstract

Activity performed by administration staffs like typing work involves a delicate interaction between perceptual, cognitive and motoric processes. For completing this type of work requires a holistic comprehension about the job which involving coordination of speed and precision. Therefore, this research tries to study about cognitive performance measurement by employing typing time scaling. There were 60 participants involved in this research with three different backgrounds from employees, university students, and lecturers. They asked to type the provided draft then their time will be calculated by the researchers to measure how many mistakes that they have done while typing the document. This study found result that participant's background gives a sound contribution in time record and typing error made by the participants. Three categories are found in time and typing errors by their own standard level based on time recording and typing results. However, this research needs plenty more follow ups such as more proportional selection of participants by using larger samples to have lots of variety in results.

Keywords: *cognitive performance, typing time, ergonomics, typing error*

1. Introduction

Human performance while working are affected by many factors like internal and external factors. The internal factor such as emotional state, sensitivity, personality, mind burden and workloads while the external factor are supervisor influence, workplace, working environment, work colleagues, family and his or her social stance. An employee who works daily with computer affected a lot with these factor and it will influence his or her working performance. As a result, they need longer time to complete their work. This working category (typing) has been learnt extensively by previous researchers for about a century. Many experimental tryouts conducted by employing different technics (Bonnie, 1996). In his article, Timothy (1986) wrote a statement that working performance of a skilled typist will continue grow and this skill is a natural behaviour which easy to measure. Apart from its simplicity then Timothy (1986) clearly define that this type of work is engaging a delicate interaction among perceptual, cognitive and motoric processes. Such a job that held by administration staff which her or his dominant work involves typing documents.

Typing also defines as a holistic comprehension about its current job which involves speed and precise coordination (Abigail and Kari, 2014). Various kind of processes performed by the employees certainly will give greater contribution to knowledge about working performance character of those who really skillfull by involving series of cognitive activities. Next, the explanation about problems in typing performance (its working performance) are abundant, as an example is over time limit during operating process. Pashler in Bonnie (1996) dug implication from aspect of selection respons in continual typing especially related to fatigue or work occupancy.

Therefore, this research tries to study about cognitive performance measurement by using typing time calculation. From the explanation above shows that typing job is a skill job (physcomotoric) which needs synchronization between speed and punctuality, a part where cognitive factor must present to balance both. Before making any typing task, an employee must make a concept and understand about the content of material which about to type. If this understanding well understood then it will accelerate typing time and resulting in less and less error in its typing task. By those results, it is expected to help increase employees' working performance in completing their working tasks. Then, from typing time, it will use to scale employee performance with workspace design which employed green ergonomic concept. Other important note is there are results from several studies about ergonomic aspect design for typing work performance which explain about some injuries potential or illness exposure which can be escalated because old model of computer hardware usage.

2. Literature

2.1 Cognitive Performance

Cognitive activity is a human behaviour which carry out by cognitive domain. The ability to evaluate cognitive work performance of someone depends on age and research design (Paula and Paivi, 2007). Within simple reaction time calculation, young subjects (age 20 – 25 years) and old subjects (age 52-63 years) consider their working performance worsening after 24 hours. Although in general cognitive work performance of older people are worse than young people. Building from some evidence seem cognitive work performance posses by women can retain in longer time than man while from physiological aspect they recuperate slower than man (Paula and Paivi, 2007). However, the mechanism that driven any difference between young person and old person among man and woman or different individual mostly unclear because it depends on the individual. Some reasoning like physiology mechanism and another factor or his/her surroundings can also been involved. In brief, there is a conclusion about big variation in subject choice and methods which make it difficult to compare if applied for different study.

In ninetyfifties, an approach to investigate many invisible human behaviours which can be observed from their visible characters has been developed and called as cognitive physcology approach. The American Dictionary (in Shaffer, 1985) defines *cognition* as mental process or ability or skill to gain knowledge. The cognitive process which helps in finding or understanding are include observation activity, making perception, learning, thinking and remembering (Shaffering, 1985).

There are some opinions about cognitive load theory. One opinion said that *Cognitive Load Theory (CLT)* is an instructional theory that starts from and idea about our working memory capacity which bounded by respons to some information that can be accepted along with some operations that can be performed based on those information. This opinion means a learner can support the usage of that working memory to work in efficiency, especially when someone must learn about a task or difficult job. Human must able to recognize rules and boundaries from our working memory to help develop the quality and instruction. In a way, the researchers as an instructional designer need to find a way to help increasing these long term memory capacity together with the working memory, and to find about how is the mechanism of an instructional material to get interacted with this cognitive system.

Other opinions stated about cognitive workload can be define as multidimensional concept which representing load which carry certain task that push the cognitive system owned by a learner (Paula and Paivy, 2007). The characteristics of task which has been identified in CLT research are task form, task complexity, multimedia usage, time pressure, and instructional steps. In essence, the *Cognitive Load Theory* suggests that every working memory has limited capacity. Most important statement from this theory is an idea that this limited capability of our working memory, whether visual or auditory, should acts as the central theme when someone decides to design an instructional message.

Mental burden is placed inside cognitive load which comes from interaction between task and characteristic from the subject. According to a model develop by Pass et.al (1994) mental burden can be calculated or anticipated from our basis knowledge about the task and characteristic of the subject. Whereas mental effort is cognitive load aspect refers to cognitive capacity that actually allocated to accomodate demand for task pressure; therefore can be assumed as reflection of actual cognitive load. The mental effort will be measured when participant is doing a task. Performance, also seen as cognitive load aspect, in education world also defined as learning achievement.

2.2 Typing Skill

Description in this chapter will discuss about result from several previous studies such as comparison of body postures as seen from gender differences together with small discussion about required time for measuring typing performance.

According to Jeng and Cheung (2012) in their research of comparison between pattern of body postures and musle control between man and woman computer users who experience musculoskeletal symptom, resulted a fact that there is significant difference between man and woman who use computer in neck and head flexy angle aspect when they do typing tasks. Man has bigger head so his neck flexy angle will look different than woman's head.

While Bonnie (1996) said about typing theory that more useful for computer system design and really needed for explaining typing data. Design information is needed before one system start to operate where model of typing technique must able to make a qualitative prediction of its working performance which relates to cognitive performance of the employee when he or she is making typing job.

The average of typing speed is 30 to 50 words in a minute. Meanwhile, time in speed typing category is between 70 to 90 words per minute. Bonnie (1996) said that the time needed by cognitive operator is 50 msec. Typing performance is measured by its speed and its error frequency (Abigail and Kari, 2014). In general, the only significant difference in its work performance that relates to computer is typing speed in computer slate which positioning lower than the other computer.

3. Method

60 participant were involved in this research where 42 people were men and 18 of them were women. The participants are people who can work typing task with age limit of 19 years old and older. Steps in this research are respondents asked to do typing task in 250 words then counted using a stop watch. The typing draft used in this research was alike. Some writing variations such as fonts, layouts and numbers were used by respondents inside their typing task. Here are some steps in data collection activity: first, researcher were setting up equipments needed like laptop and writing tools for recording and filling jobsheet in gender and age columns. Next, participants were asked to read typing text before the actual typing activity happened, when they ready, a stopwatch will start at the time the participant starting to set up documents (page set up: margin, font, and others). During typing process the stopwatch will calculate the time needed for each participant, then typing results will be saved according to the observation order (for example, participant number 20 observed and put in file under the name of 20.docx) then the researcher will record the time inside jobsheet typing test. Every participant who involved will get reward as a token of gratitude from researchers. For their last step, researchers will conduct error typing checking.

4. Result

Data of respondent is showing that number of men were greater than women where in comparison is 7 to 3. Respondents for this research were taken from various backgrounds such as employee, students, and lecturers. From research observation, there is a result which showing that the more often someone doing typing task then the less time he or she needed in completing this task. It also goes with error level that he or she did. The acquired data is showing that employee is the respondent who has the best performance. This finding perhaps because employee are making lots of typing task every day comparing to other respondents in this research, therefore they are more familiar with typing know- how and ways to operate computer in right way.

Whereas for category of dominant age is 24-28 years old which counted as 25 percent from 60 participants as the total respondents. Inside this range of age most of them were employees and lecturers. Data about gender and age descriptions presented in Tabel 1 below:

Table 1. Respondents Data

Descriptions	Indicators	Percentage	Total
Gender	Male	7%	42
	Female	3%	18
Age	19-23th	33,4%	20
	24-28th	41.6%	25
	29-33th	25%	15

Table 2 below is log data of typing time filled with mistake numbers which have been done by every respondent. For time data, researchers are using measurement interval of 8 and typing error data are using measurement interval of 16. Result of time calculation is showing that most of the participants (30 participants) are finishing typing task (250 words) in 5 – 13 minutes. It includes making a page set up and word editing. For typing time based on the acquired data will be divided in to three levels; high (< 13 minutes), average (14-20 minutes), and low (> 21 minutes). The time differences are displayed in figure 1 as follow:

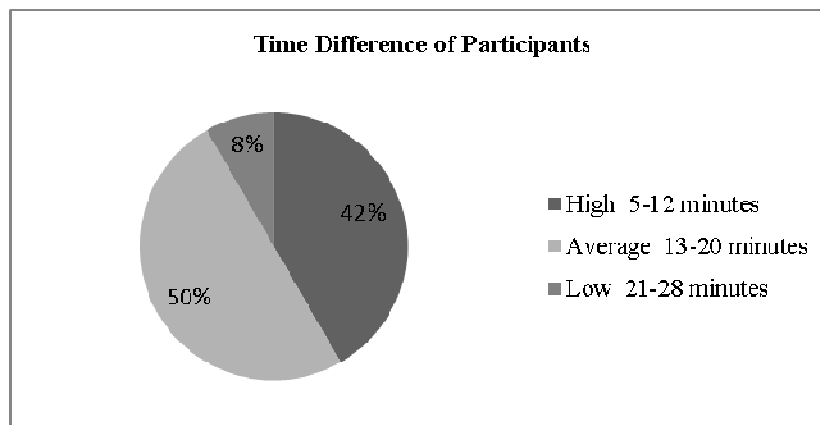


Figure 1. Time Difference of Participants

Meanwhile for the result of typing error calculation done by participants are mostly occurred in average level. The amount of typing error is 17-33 errors done by 30 participants. Typing error category then classified into three standards which based on error amounts: few (< 16 errors), average (17-33 errors) and many (34-50 errors). From 60 participants in this research there was 1 participant who make no error typing but took longer time to finish (15 minutes). Error typing differences is displayed in Table 2 and figure 2.

According to the data, best time performance is found in average level for time (13 minutes) and few level for typing error (1 mistake). From observation during data collection activity, researchers found some records about the reason of longer time of typing and many error typing done by the participants. Some reasons are participants were in rush/too hurried, careless, and few of the participants did not understand about typing set up which resulted in longer time to finish the typing task although they are familiar with the computers.

Table 2. Time Log Data and Typing Error

Description	Level	Categories	Amount of Respondents
Time	High	5-12minutes	25
	Average	13-20 minutes	30
	Low	21-28minutes	5
Typing error	Few	0-16 errors	19
	Average	17-33 errors	39
	Many	34-50 errors	2

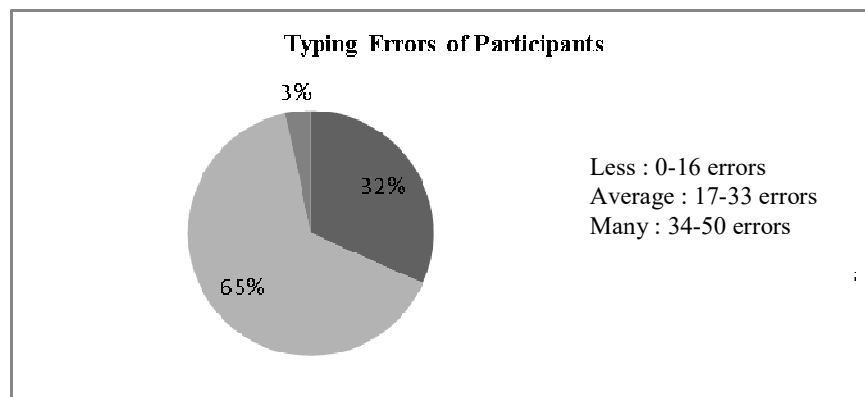


Figure 2. Typing Errors of Participants

5. Conclusion

Typing is a skill proficiency which needs cognitive factor. Ability to acquire knowledge is one of many definitions stated by experts. The cognitive process can be identified from several activities such as understanding, observing, perceiving, learning, thinking and remembering. These activities are assumed as part of the work that always performed by employees. In administration department, its staff or employee making lots of typing job in daily basis therefore they need or must perform several activities above.

Based on the result of this research, person who familiar with typing tasks when tested turn out are making some mistakes because of their unfamiliarity in setting up the documents (page set up, editing, and so on) which resulted in slow motion in their work performance. When these tasks are should be finished in less than 13 minutes however for some respondents took twice longer time.

Typing time are divided into three levels based on speed in completing typing task: high (5-12 minutes), average (13-20 minutes) and low (21-28 minutes). Whereas typing error calculation are divided based on the least mistakes: few, average, many. The result of typing time will be use to measure employee's working performance by recording how much time it takes to complete their job.

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