CALCULATOR TO ESTIMATE MOTOR SKILL INTERVENTION TIME (CEMSIT) AMONG PERSONS WITH ALBINISM IN MALAYSIA

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ABSTRACT

The development of fine motor skills of a person either children or adults depends on the development of the brain, body balance and body coordination. At the same time, fine motor skills also rely on visual acuity, which affects the persons with albinism (PWA). Their visual acuity is slightly better than the blind person, but much worse than the normal pigmented individuals. The match - board is one of the instruments invented to analyze fine motor skill. The ability was determined according to grade and scales developed by Masahide Kato (1970). This tester is employed in testing the muscle coordination of the arm specially the ability to hold the arm. Match board test requires a subject to pick pins and insert them in holes within a specified period of time. It is 250 cm x 250 cm x 15 cm in dimension; which is bulky, made of wood and steel, and heavy to carry from place to place. A previous study has identified the dexterity efficiency grade for fine motor skill among persons with albinism is low and personalized. Generally, an additional time to the proportion of 7 minutes per hour for an adult and additional of another 10 minutes for children are adequate for task with least utilization of speed and visual properties. A personalized intervention mechanism is proposed to overcome the inefficiency of motor skills among them. Subsequently, a calculator prototype to estimate motor skill intervention time (CEMSIT) was invented for PWA and the usage may be extended to other low visual individuals. CEMSIT can be paired with calculator to estimate reading time (CERT) to intervene both reading and motor skill disabilities.

Keywords: *Albinism, CEMSIT, CERT, fine motor skills, Malaysia*

ABSTRAK

Perkembangan kemahiran motor halus seseorang sama ada kanak-kanak atau orang dewasa bergantung kepada perkembangan otak, keseimbangan badan dan koordinasi badan. Pada masa yang sama, kemahiran motor halus juga bergantung kepada ketajaman penglihatan yang memberi kesan kepada penghidap albinism (PWA). Ketajaman penglihatan mereka adalah sedikit lebih baik daripada orang yang buta, tetapi lebih terok dibandingkan dengan individu berpigmen yang normal. *Match-board* adalah salah satu alat yang dicipta untuk menganalisis kemahiran motor halus. Keupayaan ditentukan mengikut gred dan skala yang dibangunkan oleh Masahide Kato (1970). Alat uji ini digunakan dalam menguji koordinasi otot lengan, khususnya keupayaan untuk menyokong lengan. Ujian *Match-board* memerlukan subjek untuk mengambil pin dan memasukkannya ke dalam lubang dalam tempoh masa yang tertentu. Ia berukuran 250 cm x 250 cm x 15 cm dimensi; bersaiz besar, diperbuat daripada kayu dan keluli, dan berat untuk dibawa dari satu tempat ke tempat yang lain. Kajian sebelumnya telah mengenal pasti gred ketangkasan kecekapan untuk kemahiran motor halus dalam kalangan penghidap albinism sebagai rendah dan spesifik. Secara amnya, masa tambahan dengan perkadaran 7 minit setiap jam untuk orang dewasa dan tambahan 10 minit lagi untuk kanak-kanak adalah mencukupi bagi tugasan yang kurang menggunakan ciri-ciri kelajuan dan visual. Satu mekanisme intervensi secara spesifik adalah dicadangkan untuk mengatasi ketidakcekapan kemahiran motor dalam kalangan mereka. Justeru, prototaip kalkulator untuk menganggarkan masa intervensi kemahiran motor (CEMSIT) telah dicipta untuk PWA dan penggunaan boleh diperluaskan kepada individu lain dengan visual rendah. CEMSIT boleh dipasangkan dengan kalkulator untuk menganggarkan masa membaca (CERT) bagi intervensi kedua-dua ketidakupayaan membaca dan kemahiran motor.

Kata kunci: Albinism, CEMSIT, CERT, kemahiran motor halus, Malaysia

INTRODUCTION

Albinism has been in "literature" since the beginning of medical literature. There have been several Greek and Roman authors to name a few; Plinius Secundus and Aulus Gellius that have described albinism in man. Tyrosinase deficiency causes albinism; and in animals it was first demonstrated in 1904. The first accurate scientific paper written about albinism was by Sir Archibald Garrod in 1908.

Albinism is a group of genetic conditions that causes a lack of pigment. It can affect only the eyes (ocular albinism) or both the eyes and skin (oculocutaneous albinism). Most types of albinism are inherited when an individual receives the albinism gene from both parents. The exception is one type of ocular albinism, which is passed on from mothers to their sons. Previously, fine motor skills have been of little or no interest to researchers in terms to determine the potential of a person with albinism compared to the pigmented individual. This study takes a look at new lines of thought that implies that fine motor skills can be of significance to identify the different ability between the pigmented individuals to person with albinism.

In the previous study (Mai Shihah, Julismah and Nelfianty, 2012), we employed two instruments *Match-Board* and *Phepple-Type Stabilimeter* that were calibrated to determine the correlation of aptitude test and fine motor skills for both gender and age groups as compared to with grades and scores described by Masahide Kato (1970).

LITERATURE REVIEW

Fine Motor Skills and Abilities

Fine motor skills are basic for individual development, and their deficiency would cause the attainment of a child's milestones in his/her journey to adulthood. At present, cognitive abilities are results of intelligence tests. Nevertheless, there are reasons to expect fine motor skills could also contribute an influence. The fine coordination of small muscle groups, above all those in the hand, is essential for a variety of activities.

In fact, fine motor skills correlate consistently with general as well as specific cognitive abilities. Relationships have been confirmed with optical differential abilities (eye-hand coordination), reaction speed (Voelcker-Rehage, 2005) and intelligence (Baedke, 1980; Solan et al., 1985; Wasserberg et al., 2005). Further studies confirm correlations between fine motor skills and scholastic performance up through, at the written assignments (Graham, 1990; Graham & Weintraub, 1996). Interestingly, significant relationships have been detected between fine motor skills and reading skills that are essential for all scholastic subjects (Graham, 1990; La Paro & Pianta, 2000; Reno, 1995; Savage, 2004; Share, Jorm, Maclean, & Matthews, 1984).

Albinism and Factors Contributing to Deficits in Fine Motor Skill

Persons with albinism also have been reported as emotionally unstable compared to pigmented individuals (Mai Shihah & Yogeswaran, 2009; Mai Shihah & Julismah, 2005; Ezeilo, 1989). Research has demonstrated the significant relationship between fine and gross motor ability, self perceptions and self worth in children and adolescents (Mai Shihah et al., 2013) in both athletic and scholastic competencies (Piek et al., 2006). Mai Shihah et al. (2013) has reported that time allocation varies among age groups. They also predicted that poor motor skills often noted among person with albinism may lead to poor performance in physical activities and cognitive domain. In which may reduce a child's sense of competence in both worlds. Subsequently, it may lead to withdrawal from movement activities that would, in turn, lead to limited opportunities to practice motor skills in physical activities (Skaggs & Hopper, 1996) and participate socially (Skinner & Piek, 2001).

The previous study (Mai Shihah and Julismah, 2005) has proven the significance of estimating the extra time of 30 minutes for every hour as an intervention strategy to aid PWAs in reading. Hence, Match-Board and stability meter are both administered to evaluate motor skill ability among PWA and Mai Shihah, Julismah and Nelfienty (2013) in their paper estimated 7 additional minutes for every hour.

Studies on the effects of fine motor skills among persons with albinism are almost none to the best knowledge of the authors. Due to scarce information in context of person with albinism's motor skill abilities, the primary objective of this preliminary study is to assess skills and dexterity of finger movements and stability of the arm among respondents in Malaysia. During the data collection, the prime problem faced by the researchers was the study was too time-consuming due to the limited unit of instruments. We were provided with one unit each of the Match-Board

and stabilimeter. Match board test requires a subject to pick pins and insert them in holes within a specified period of time. It is 250 cm x 250 cm x 15 cm in dimension; which is bulky, made of wood and steel, and heavy to carry from place to place.

OBJECTIVES

Therefore, the team was seeking for means to innovate the Match-Board into a simpler and more convenient instrument. To this date, the innovated instrument is still in a trial and standardization stage.

METHODOLOGY

The Match-Board (Figure 1) was innovated into a computerized tool (Figure 2) which is easily uploaded by the researcher and downloaded by the respondent. The innovated match-board was an epithet "Calculator to estimate Motor Skill Intervention Time"- (CEMSIT). In the preliminary study 50 normal individuals aged between 18 to 52 years old with a 6 /6 eye acuity (with or without visual aid) volunteered to perform the motor skill test using both the original match-board and the computerized match-board.

Briefly, for test on skill and dexterity in the movement of fingers using the original match-board, the respondent is asked to take out one by one the small stick from the stick holding box with his dominant hand and placed them into the holes in the plate as fast as he/she can in the right order from the upper left to right (reverse the order for a left-handed respondent). The respondent is given preliminary practice with five sticks. When the respondent is ready, the test is carried out for two minutes. Then, the respondent is requested to repeat the test using the CEMSIT. Motor skill test using CEMSIT was conducted using the mouse.
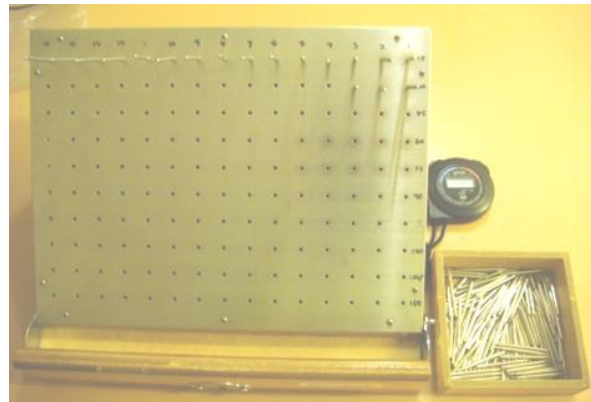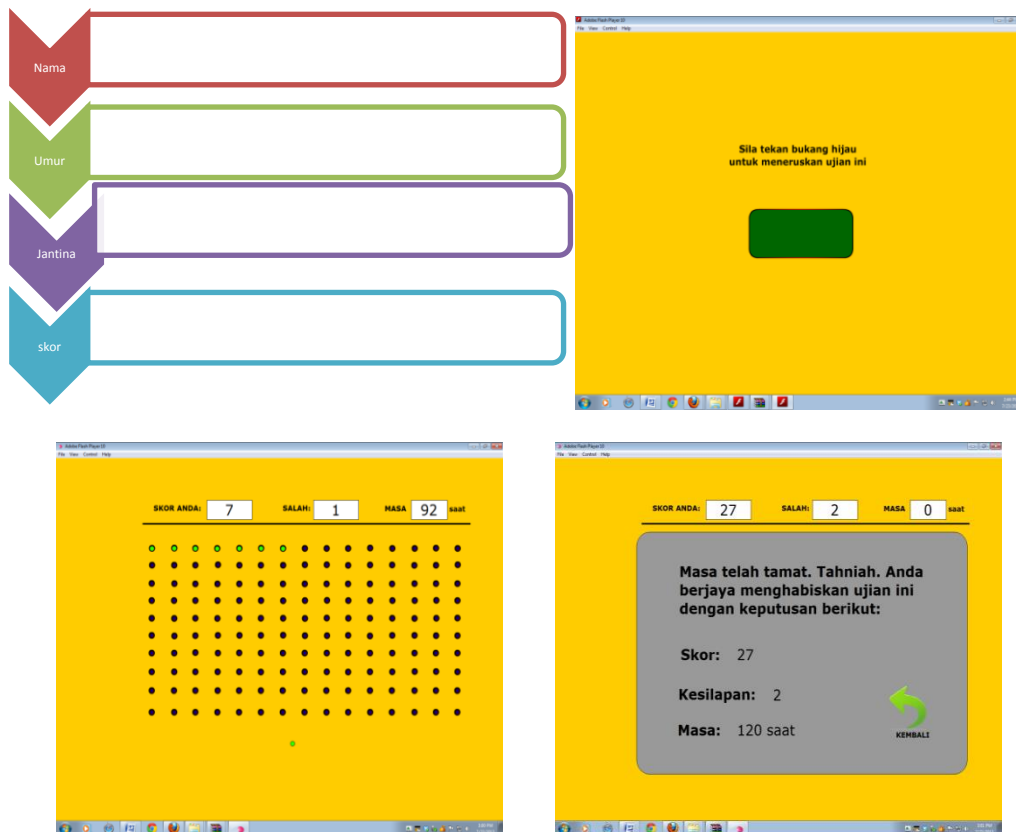

Figure 1. Match-Board

Figure 2. Computerized Match-Board

RESULTS AND DISCUSSIONS

The preliminary results showed that the performance of the users was reduced in half of their normal ability when the computerized match-board was administered. The results do not synchronize with our computerized Calculator to estimate Reading Time (CERT) (Figure 3) invented previously by Mai Shihah (2009) to estimate reading time intervening.

An explanation to this may be due to the CERT does not require hand movement and only concentrating on eyesight ability. For CEMSIT both are used simultaneously and furthermore, some of the respondents were not used using mouse.

Despite of this weakness, CEMSIT does benefit in several manners such as it can be copied, installed on computers and respondents can perform the test simultaneously. On top of it, researchers are not burdened to carry the original match-board with is bulky and heavy. Besides, researchers are not required to be the time keeper and to monitor each respondent closely to ensure the test is conducted correctly. Last but not least, there won't be a problem of missing pins and mishandling the instrument which is very expensive and becoming a rare item to order.

In our previous studies (Mai Shihah, Julismah and Nasuruddin, 2012; Mai Shihah, Julismah and Nelfianty, 2013), we employed two instruments *Match-Board* and *Phepple-Type Stabilimeter* that were calibrated to determine the correlation fine motor skills for both gender and age groups as compared to with grades and scores described by Masahide Kato (1970). When CEMSIT is administered to replace the original match-board, the same grade is used and scores by the respondents are multiplied by two.
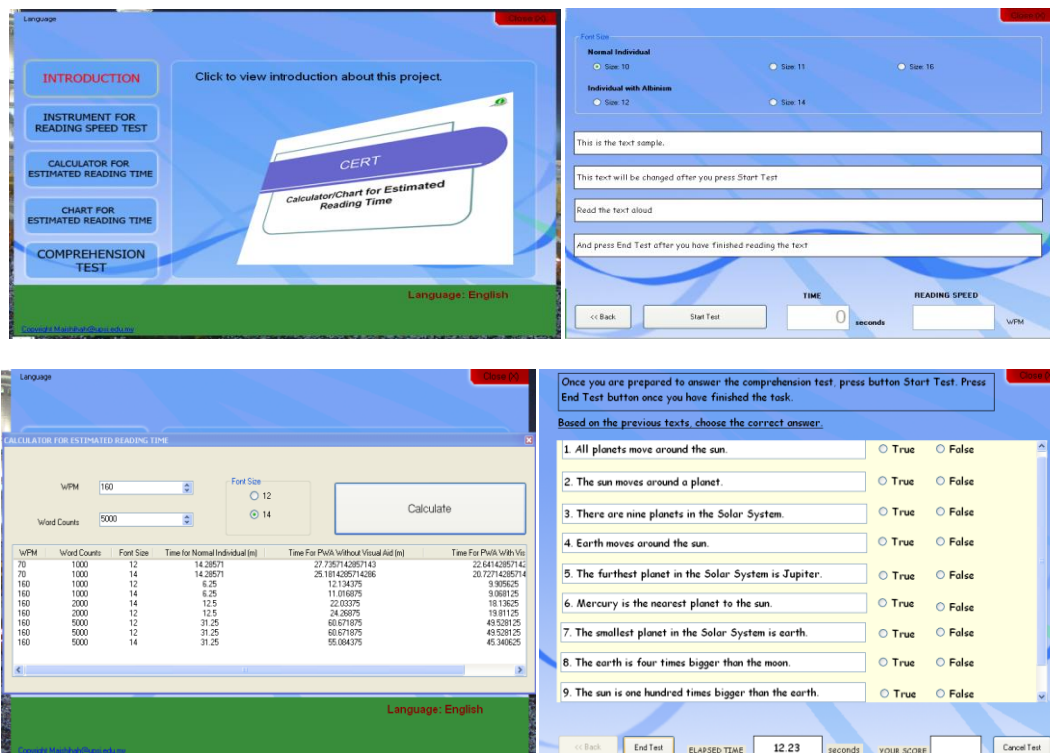
Figure 3. Calculator to estimate reading time (CERT)

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CONCLUSIONS
A personalized intervention mechanism is proposed to overcome the inefficiency of motor skills among persons with albinism. Subsequently, a calculator prototype to estimate motor skill intervention time (CEMSIT) was invented not only for PWA but may be extended to other low visual individuals. CEMSIT can be paired with calculator to estimate reading time (CERT) to intervene both reading and motor skill disabilities.

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