

Short Sensory Profile Assessment System for Autism Children

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Abstract— Autism Spectrum Disorders (ASD) are life-long neurodevelopmental disorders characterized by impairment in reciprocal social interactions, impairment in verbal and non-verbal communication skills, and restricted repetitive and stereotyped patterns of behaviour, interests and activities. Children with ASD normally shows the sensory impairment and struggles to process sensory data. Short Sensory Profile (SSP) is an assessment tool which is widely used to identify whether the autism children have exhibited the sensory disorder. There are seven parts of the questionnaire which are tactile sensitivity, taste/ smell sensitivity, movement sensitivity, under responsive/ seeks sensation, auditory filtering, low energy/ weak and visual auditory sensitivity. The problem with the current system is that the assessment is being done manually whereby it requires the therapist to spend more time and effort to get the results. Therefore, by providing a web-based SSP assessment system, it will ease the therapist to automate the manual process and receive the output easily. In addition, the profile of the patient can be stored digitally and can be referred for future reference of developing and revisit the therapy plan.

Keywords— Short Sensory Profile, Autism, Web-based System

I. INTRODUCTION

Autism Spectrum Disorders (ASD) is a life-long neurodevelopmental disorders characterized by impairment in reciprocal social interactions, impairment in verbal and non-verbal communication skills, and restricted repetitive and stereotyped patterns of behaviour, interests and activities [1]. The Short Sensory Profile (SSP) is an assessment tool on sensory processing for the parents or caregiver to answer based on their observation of their children. The SSP assessment can be done to the children who has ASD symptom or those who has not. SSP normally being used during the autism screening process. The SSP is important to measure the sensory processing abnormalities in children [2]. It is an empirical assessment which consists of seven parts which are tactile sensitivity, taste/ smell sensitivity, movement sensitivity, under responsive/ seeks sensation, auditory filtering, low energy/ weak and visual auditory sensitivity [3].

With manual SSP assessment, the parent is required to fill in the assessment questionnaire and wait for the observation and results from the therapist or clinical psychologist. Meanwhile from the therapist or clinical psychologist part, they are required to spend more time and effort to do the manual calculation for the SSP assessment. If they have many appointments, it can be more tedious and

tiring process for them. This is the drawback that can be seen from the manual assessment process. Therefore, by providing a web-based SSP assessment system, it will ease the therapist to automate the manual process and receive the output easily. In addition, the profile of the patient can be stored digitally and can be referred for future reference of developing and revisit the therapy plan.

The objective of this paper is to present the SSP assessment for children which is developed through a web-based platform. The remainder of this paper is organized as follows: Section II discusses the related works, Section III highlights the research methodology, Section IV presents the results and discussion. Finally, Section V concludes the paper.

II. RELATED WORK

It is known that ASD is a neurodevelopmental disorder with the main features of social communication difficulties and repetitive and impairment of sensory-motor behaviours [4]. Patients who have been diagnosed with ASD have to bear with this lifelong condition, and as of now, there is no cure for it. Children with ASD often face challenges in terms of behavior, activity daily living, communication, cognitive, social and psychomotor [1, 5-7]. There are several screening tests conducted to ASD children including M-Chat-R, DSM5, ESDM and Short Sensory Profile (SSP) that have different

purposes. Modified Checklist for Autism in Toddlers, Revised (M-CHAT -R) has a set of 20 questions that will ask about a child's behaviour for screening purposes [8]. This assessment is intended to evaluate risks for autism in toddlers between 16-30 months of age. DSM-5 is an assessment where the therapist is responsible to diagnose any potential autism spectrum disorder patients with non-physical problems. Early Start Denver Model (ESDM) is a behavioural therapy for children aged 12-48 months with autism. It is based on the methods of Analysis of Applied Behavior (ABA).

A. Short Sensory Profile (SSP)

Sensory processing is about how the information from the sensory systems which are sight, hearing, taste, touch, smell, body awareness and balance are being interpreted and registered by the brain. It is related to how effectively the information is being processed and affects the concentration, behaviour and responses. Hence, it is crucial for a child to take the Short Sensory Profile (SSP) assessment as the parent will be aware whether their child has good sensory processing or vice versa. Moreover, sensory processing is quite important as it will form the basis of learning experiences and it is good for child development to develop skills and behave accordingly in any situation.

Short Sensory Profile (SSP) is a standard method to measure the children's sensory processing abilities and to profile the effect of sensory processing which may create barriers on functional performance in the children's daily lives. SSP is designated for children aged 3 to 10 years old [9].

The result of SSP is done manually by calculating each section from the questionnaire that is divided into seven sections. The sections are Tactile Sensitivity, Taste/Smell Sensitivity, Movement Sensitivity, Underresponsive/Seeks Sensation, Auditory Filtering, Low Energy/ Weak, and Visual/Auditory Sensitivity. The total score is classified into typical performance, probable difference and definite difference and each classification has its own range depending on the section [3].

III. METHODOLOGY

The development project had used the iterative and incremental software development process. This process has been chosen because this model is a bit flexible since we can repeat the cycle before moving to the next phase. Therefore, with this model, we can revise and improve the project when needed. For the system requirement, information about the system was gathered by interviewing the Head of Therapist from Penawar Special Learning Centre which is a wing under Hospital Bandar Penawar for learning

disabilities to obtain more information about the SSP assessment.

Next, is the system design. This phase is an activity to identify the project requirement. This is to ensure that the system is convenient and user-friendly for the parents. Then, the system design is realized to have a clearer view on how the system will look and how the system is going to work. Moqup has been used to create the interface of the website.

The next process is the development phase. This is where the assessment is being applied in a website. For implementation, Adobe Dreamweaver was used as a platform with HTML, CSS and Javascript for user interface. For the system database, we have used the NOsql.

The final phase in the development is the testing activity. For this phase, user acceptance testing was carried out. This is to find any problem that needs to be solved and to make sure that the system is fulfilling the requirements and fully functioning.

IV. RESULTS

A. System Flowchart

The system flow diagram as shown in Figure 1 gives a clear view of the process and how the website is functioning for the parent and the therapist. The users of the system are the parent and therapist whereby both of them should login to use the system. The parent will take the M-CHAT-R assessment. Then, the result will be displayed on the therapist's dashboard. The parent also can set an appointment with the therapist to take a DSM5 or ESDM assessment for their child. After that, the therapist will allow the parent to answer the SSP assessment on the website and the parent will set an appointment once the parent has finished answering the questions of SSP assessment with the therapist for further therapy session.

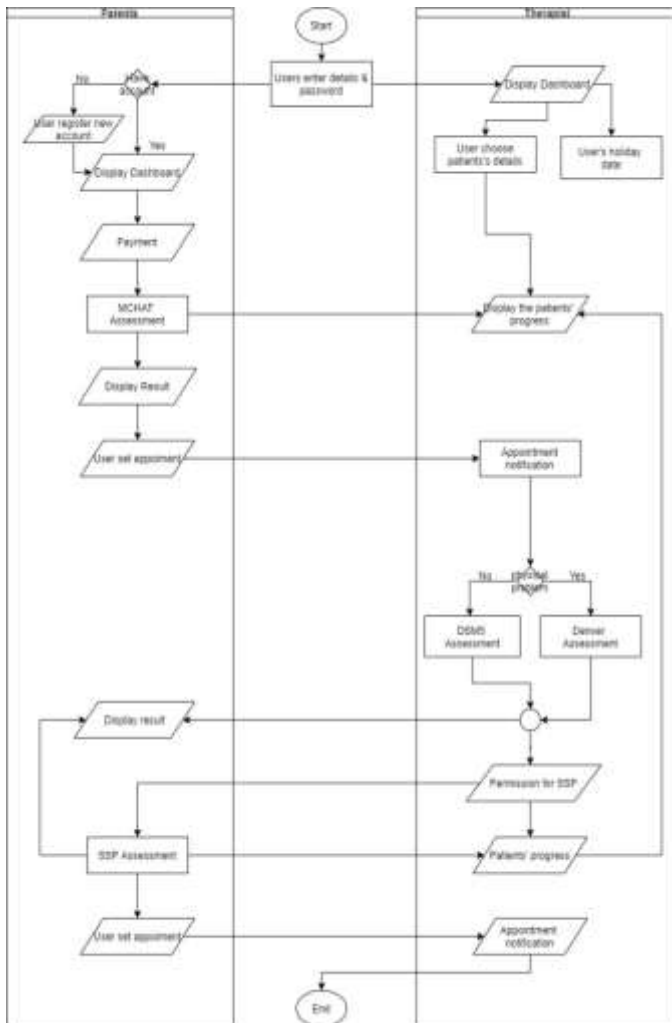
B. System Features

There are five features developed in this system which are explained below:

- **Sign up and Login page:** This page is for the parent and the therapist to sign up and login to the website.
- **M-CHAT-R and SSP assessments:** These are the assessments that the parents will answer based on their child's behaviour and it will calculate the score and give out the result.
- **DSM5 and ESDM assessments:** These are the assessments that will be used by the therapist to answer the questions by observing the child's behaviour and it also will calculate the score and give out the result.

- **Booking Appointment:** This booking appointment will help the parent to book an appointment with the therapist via online.

a login area on the same page to make it easy for the parent to login into the website.



- **Parent's Dashboard:** This is the dashboard for the parent to monitor their child's result and progress. On this dashboard page also will show the child's details.
- **Therapist's Dashboard:** This is the dashboard for the therapist to monitor the patients' records and progresses and could arrange the appointment with the patient.

Fig. 1 System Flowchart

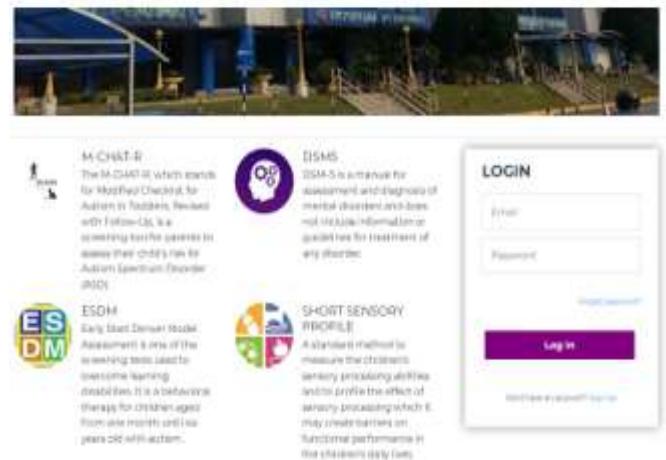


Fig. 2 Home Page of the Website

The sign-up page is dedicated for the parent to register their new account is shown in Figure 3. On this page, the parent needs to give their details as well as their child details. All details are stored digitally in one centred database. This is to ensure that the data can be retrieved in future for further analysis.



Fig. 1 Sign-up Page

B. System Interface

Figure 2 illustrated the homepage for the website. On this page, M-CHAT-R, DMS5, ESDM and SSP are explained briefly. Hence, the parent will know more about the assessments that they will take on the website. There is also

Figure 3 presents the parent's dashboard. It will show the details of the child, the result of the assessments and the appointment date and time with the therapist.

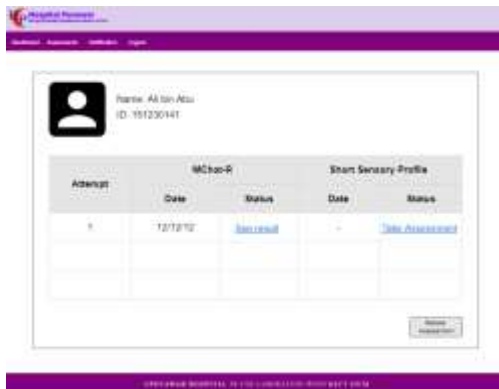


Fig. 4 Parent's Dashboard

For the therapist's dashboard, it will show and update the patients' records. The therapist is able to view the records such as the details of the patient, the score of the M-CHAT-R and manage the appointment with parents.



Fig. 5 Therapist's Dashboard

Figure 6 shows the first assessment that a parent needs to take and answer it by observing the behaviour of their child. The result will be shown at the end of the M-CHAT-R assessment.



Fig. 6 M-CHAT-R Assessment Page

This is the last assessment that the parent needs to take and answer the questions by observing their child's behaviour which is the SSP assessment. The result will be shown at the end of the assessment. The therapist is able to print the SSP result for further analysis during the screening observation with the patient. The sample page of the SSP assessment can be referred to in Figure 7.



Fig. 7 SSP Assessment Page

V. CONCLUSIONS

The advantages of SSP paper-based is it is easy for parents who are not used to the technology. A parent can complete the questionnaire without access to the Internet and do it manually. However, by doing the questionnaire manually, it will take time to get the result as the calculation of the scoring is also done manually. Furthermore, it is also not accessible from anywhere. For example, the parent needs to go to the hospital to answer the questionnaire. Moreover, it is also paper based as it will lead to deforestation to produce a paper which is not good for the environment. It is also hard for the therapist to key in the data in the database manually.

The aim of this project is to develop a web-based assessment system of SSP for children. This website could help the parent and the therapist to access the system, conduct the assessments and view the dashboard of the child's profile regardless of location and time. As parents in this new generation who are busy with working, this will ease the parents for not having to go to the hospital frequently and to suffer from so many procedures as it took time to take the assessments. Furthermore, this also will ease the burden for the therapist as the therapist could manage his/her appointment with the patient without having difficulties, the therapist does not have to calculate the result manually as the system will automatically give the result and the therapist could also monitor and keep track of his/her patient's progress.

Hopefully, with this project, it could raise awareness among parents the importance of M-CHAT-R, DSM5, ESDM

and SSP assessments as it could help the parents to detect early if their children could have suffered from learning disabilities.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of Interest

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