



Innovative Application for Monitoring Child Behavior Using Play Therapy

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Abstract: Devices such as cell phones, tablets, laptops, etc., have become children's material support when parents neglect them. Without emotional support, and little parental guidance children will eventually suffer from insecurity, depression, and anxiety. Thus, to bridge this gap called emotional detachment between parents and their children, this research will introduce an android-based application called Child Psychology Monitoring and Learning System (CPMLS), which is designed to assist parents in monitoring their child's psychological state. It is designed for children between the ages of 3-9 years and is grouped into three categories, i.e., 3-5, 6-7, and 8-9, respectively. Within this application, various digital games will test the child's emotional and social intelligence using play therapy. As a result, parents can keep track of what their child is experiencing on a psychological level. It has been observed that the react world activity give the prediction of about 30 percent shyness, 25 percent arrogance, 40 percentage isolation, and five percentage child abuse and approximately 30 percentage focused, 45 percentage Impatient, and 25 percentage dedicated results were obtained from the beat-the-clock activity

Keywords: Play therapy, mobile application, child psychology, child monitoring, mental growth, emotional and social intelligence

I. INTRODUCTION

In this modern era, parents are working to support their families. So, the working parents have a different schedule in turn, which lets them ignore their kids. Children, who did not get the proper attention of their parents, would like to seek attention from any other thing that can be negative or positive [1], [2]. They become less responsive and have a poor understanding of other people. Their parents will never know about their mental growth or about their upcoming steps or whatever goals revolving in their minds [3]. Moreover, there are many causes of child abuse. The most prominent one among the reasons is mental illness, as well as psychological problems. Having little to no emotional and physical support from parents ultimately contributes to children becoming victims of depression and anxiety. Notably, these things bring the worst of the consequences, which may include a deteriorating personality and lowered self-esteem of the child. Therefore, after a literature review, it has been observed that there is no way available for parents to monitor child mental health [4].

The next generation of distributed and dynamic healthcare systems will rely heavily on mobile applications

[5] [6]. That why this research proposed an android based solution called CPMLS (Child Psychology Monitoring and Learning system).

CPMLS comprised of two applications, one in which parents can registered their child so that can monitor their child mental stage and the other is Child application which contain two type of game (consist of interactive scenarios) i.e. Beat the clock and React world. Each of these games consist of different interactive activities and an analysis report will be obtained based on child response. The analysis report will predict child behavior e.g. percentage of shyness, arrogance, isolation child abuse, focused, impatient and dedicated.

Neuroscience has finally highlighted the importance and working of brain processes that play a key role in learning. Neuroscience is constantly growing and has discovered new ways of learning. Education is not just about memorizing textbooks. It is actually about how you deal with real-life issues and challenges. Educational Neuroscience, also called Neuro education, aims to analyze the processes involved in learning while ensuring flexibility so that people can cope with social and emotional difficulties. Educational Neuroscience can be of enormous value if all the concerned

authorities, teachers, and learners welcome it with open arms [7], [8].

Exposure to emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, death of a parent, domestic violence, family member with addiction, family member with depression or mental illness, and family member jailed are all considered adverse childhood experiences (ACEs) [9]. Child psychology research study includes every aspect of child physical, cognitive, and social/emotional development, including how children learn, think, interact and respond emotionally to those around them, make friends, understand emotions and their own developing personalities, temperaments, and skills. It helps to understand child behavior better. It modifies a child's physical, cognitive and social, and emotional development. By studying how children develop, it can be learned more about how a child develops, why they develop the way they do and the ways to help them to develop effectively. It can also be understood why some children have difficulties and how to help them overcome them [10]. It can also help to understand environmental factors that influence how a child grows physically, emotionally, and mentally [11].

The paper is structured as follows; Section 1 provides an introduction to neuroscience and child psychology. Section 2 describes the literature review of the research; Section 3 delivers the system design, which includes a system diagram, use case diagram, and flowchart of application. Section 4 demonstrates the designed algorithm utilized in this research which focuses on behavioral analysis. In section 5, the Methodology has been described, which explains the overall flow and working of the system. Section 6 describes the Analysis Stage of this application. In Section 7, we will provide the results. Section 8 gives future guidelines and the conclusion that can be faced for technically monitoring psychology.

II. LITERATURE RIVIEW

Due to the pioneering work of child psychotherapists and psychologists, the significance of play and play therapy in a child's life and the management of his/her issues, respectively, are now recognized daily [12]. Play therapy is one of the main psychotherapeutic approaches. It is widely used to assist children ages 3 to 12. It is a process through which one can express repressed thoughts and emotions through play. As play is the language in which a child can express himself. It is the most significant way to know the hidden sides of children in their development age [13]. Lanneret says in his book toys are used like words by children, and play is their language. The use of toys enables a non-threatening way for the child to express himself. Play is the most self-directed and dynamic way of exploring and building a relationship between the child and the therapist [14].

Play therapy has two different types called Directive Play Therapy and Non - directive Play Therapy. The directive method starts with the therapist or counselor setting up desires for the kid for the duration of play [15], [16]. As an

instance, if an infant is suffering from anger problems, a therapist may additionally give that toddler a dollhouse, establish a conflict between the dolls, and inspire him or her to work through the struggle without resorting to anger or violence. Via displacing the conflict onto the dolls, the child is capable of method familiar situations with a stage of personal detachment that allows them to broaden more rational answers [17]. In the Directive Approach, the therapist is known to the child's conditions and adopts the concerned play with the child. Also, this is called directive because the child is directed to do the tasks of play, and the child can explore himself to heal his problems. Non-directive therapy is a child-centered approach based on the concept that under optimal therapeutic conditions, children have the tendency to heal themselves [18]. This therapy is non-directive in that it will leave direction and responsibility to the child alone. The therapist's part is mostly to observe what the child picks for play sequences and play themes. As children are usually unable to communicate their emotional experiences through cognitive and language skills, this approach can assist the therapist in developing better insight into what the child wants emotionally [19]. Play therapy techniques are helping children for more than 60 years. It has been providing genuine play techniques which are non-threatening, effective, and easy. These techniques are adaptive and exciting for the children. Play therapy will only be successful and effective if the child can become knowledgeable and express what he feels [20].

There are many games and techniques which are helpful for the betterment of young children's psychological needs. There are many interventions for this because there are many techniques with different types of problem statements [21]. The main goal was to look up the age of 3-9 years children. Tara M. Halls's paper best suited the requirements of this application. Games like Feeling Word game, Color-Your-Life, The Mad Game, Beat the Clock, etc. were very helpful [20] and also the motivation of this work. Wenjun et al, [22] proposed a smartphone application for monitoring emotional discomfort in young children aged 5-7 years old was developed using state-of-the-art PROMIS (Patient-Reported Outcomes Measurement Information System) methodologies. For young children aged 5-7 years, this programme was simple to operate and the animated elements were simple to grasp. When compared to child self-report, there are strong and moderate correlations between parent-child reports. Parents underestimated child sadness and overestimated child anger and anxiety. According to Marsha [23] supervision, as well as a healthy parent-child attachment link, are important in reducing a child's improper behaviors. In 2021 timothy in his research look at the impact of employing Child-centered play therapy (CCPT) on externalized behaviors in the classroom with primary kids who have had Adverse Childhood Experiences (ACEs) and are attending a trauma-informed school. The findings demonstrated that 16 sessions of CCPT were successful in minimizing externalized behaviors in the classroom for children who had experienced trauma after completing the suggested visual analysis of data for single-case research design. In 2021 Maggie et al, found 32 between-group

design research studies that looked at the impact of CCPT on children who had been exposed to ACES such as childhood poverty, systemic prejudice, attachment issues, abuse, and parental imprisonment. In addition, the authors evaluated the research quality and potential sources of bias in the papers that were discovered[24].

All the techniques require a therapist’s full attention and the child’s full faith in the therapist. A child will interact with the therapist when only they have confidence that the person he is addressing is trustworthy [25]. Play therapy can be implemented individually, in groups, and with family. All have different impacts on children.[26], [17]. The major focus was on the games played with children individually, which are designed for making children expressive, empowered, and self-confident [27]. The principal objective of play therapy is to assist the child in overcoming suppressed feelings that can be emotionally draining and cause disturbing behavior at home or in school [28]. This method is a widely researched one and has proven to be effective with children that suffer from the following issues: depression, fear and anxiety, parental separation/divorce, abuse and ignorance, social adjustment problems, attachment difficulties, trauma, reading/communicating difficulties, chronic illness and disability, selective mutism, and autism [25].

III. SYSTEM DESIGN

CPMLS comprises two android applications, one of which is designed for parents and for child. It is designed to allow the parents to learn about their children's psychology and how they ought to perform under challenging scenarios. The parent application is designed for the registration of their kids, i.e., through email id. All the information that the parent will give about their child will be stored in an online database, i.e., fire-base. Whereas, the second application designed for the child is about learning and monitoring their mental state. The interactive scenarios have been made in two techniques that are mentioned. With the help of different activities, an analysis of the responses of a child will be obtained. All the responses or data obtained from a child application will be stored in a fire-base database server online which is a normal practice [29]. Both the parent-child applications are online and offline compatible. The derived data is continuously synced on the server. Because of the firebase, this application has offline compatibility; the data collected for the analysis on the offline mode will be automatically synced to the server once it is connected to the Internet. The system diagram is depicted in Figure 1.

Figure. 1. System diagram of the system proposed

The program begins with a user accessing the first screen of the project. The application will then ask the user to register first, i.e., making an account by inputting all the required information relating to the child. If a user already has an account, then it would only require a login session to proceed further. After login, two games will be available for children to play (React World & beat the clock). The system

will record the results and perform analysis according to the information provided by the children during games, and sent the results to parents. Fig 2 shows the working process of the application.

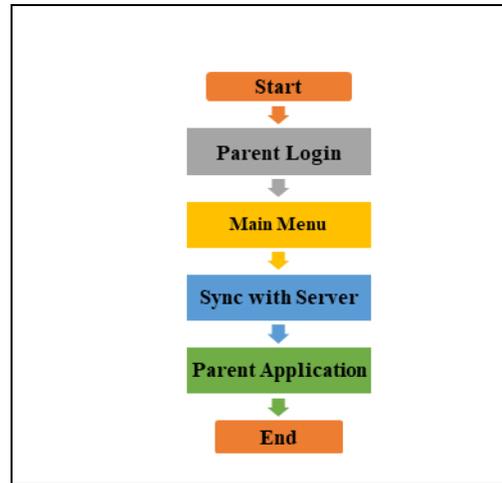


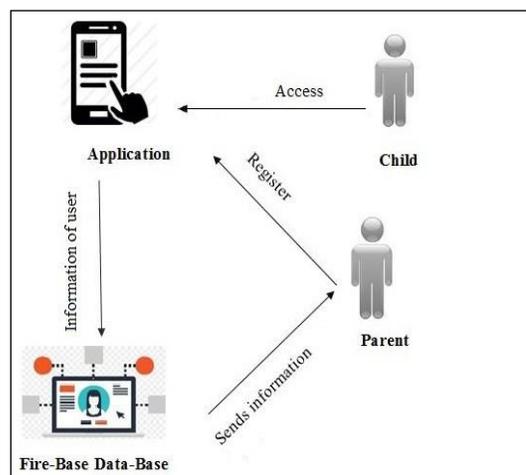
Figure. 2. System Flow Chart

IV. DESIGNED ALGORITHM

The algorithm was primarily designed for 3-9 years of children. To predict and analyze child psychology three categories are utilized according to children's age is 3-5, 6-7, and 8-9 respectively, The application has two main activities, which are designed to monitor six different statistics of a child, which include shyness, arrogance, isolation, child abuse, focus, and determination ability. All the activities are standardizing according to the age groups defined. Throughout the application, different kinds of questions in multiple ways urge the child to complete different scenarios. The questionnaire mainly includes polar and selection-based questions, where the child has to select the best answer, they think. The algorithm works on the most selected options by the child. The possibilities are categorized to identify the major, minor and normal stages. The results of games are analyzed on the responses and reactions of a child in every game.

V. METHODOLOGY

In this section, the overall system flow is described. The



games are divided into three basic levels, which are Beginners, Intermediate, and Advanced, according to the age groups, i.e., 3-5, 6-7, and 8-9 respectively. Every game target a different problem statement.

A. Game 1: React World

React World has 12 levels set according to the age grouping, i.e., beginners, intermediate and advanced. Videos are shown on every level, and after short intervals of time, video pauses and questions appear on the screen based on the video part shown. There are three options for each question. A child must choose one of them according to their mood. The options are set to categorize the condition of the child in major, minor or normal stages. The selected option is sent to the server as data for a result. Figure 3 depicted the working of the react world game.

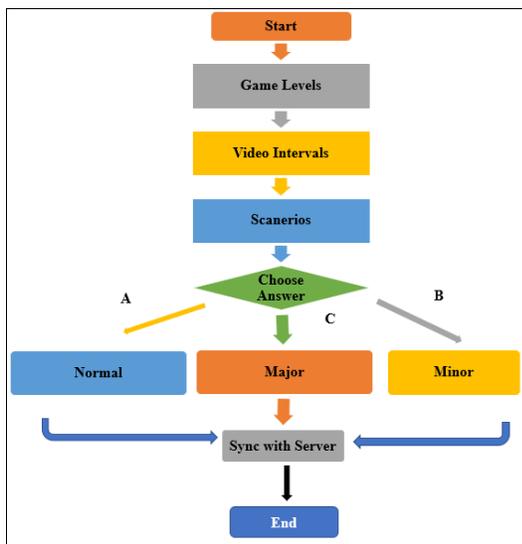


Figure. 3. Game 1: React World

B. Game 2: Beat the Clock

Beat the clock has three different activities, Puzzle, Jumbled worlds, and Rhymes. These activities are paused at time intervals by other distractive activities. The Time child takes to solve or play the main activities is noted. By this technique, focus, determination, and impatience are monitored in children. How the distractions are working is briefly explained in Figure. 4.

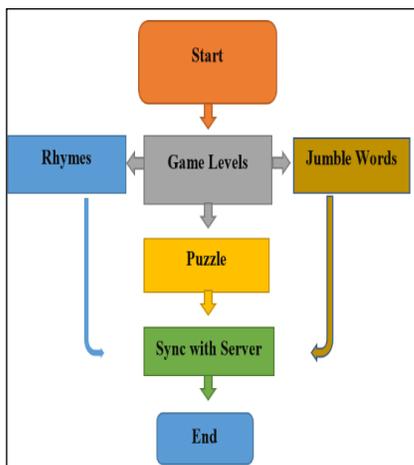


Figure. 4. Game 2: Beat the clock

Figure. 5 shows the activity of beat the clock game jumble words, which are distracted by mini poems. After time intervals, poems appear on the screen while a child concentrates on solving the Jumbled words. The child's state of mind is observed here. Rhymes are for the Intermediate level. Children watching rhymes are interrupted by math problems. Quick solving math problems is the distractive activity for this game. While listening to rhymes, some children were impatient, and some were focused. Mental growth was monitored more accurately with this Beat the clock overall game. Figure. 6 shows the flow of rhymes.

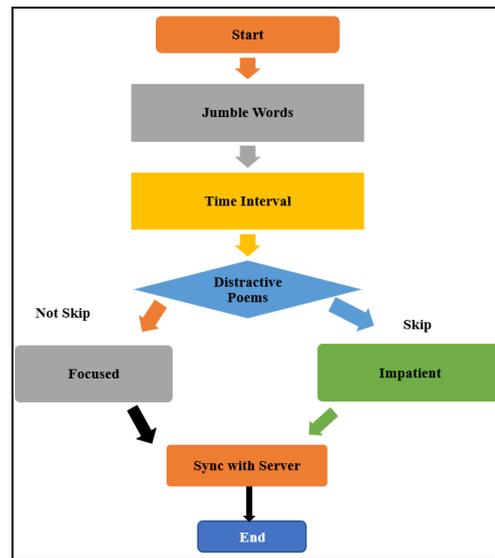


Figure.5. Working of jumbled words level in beat the clock game

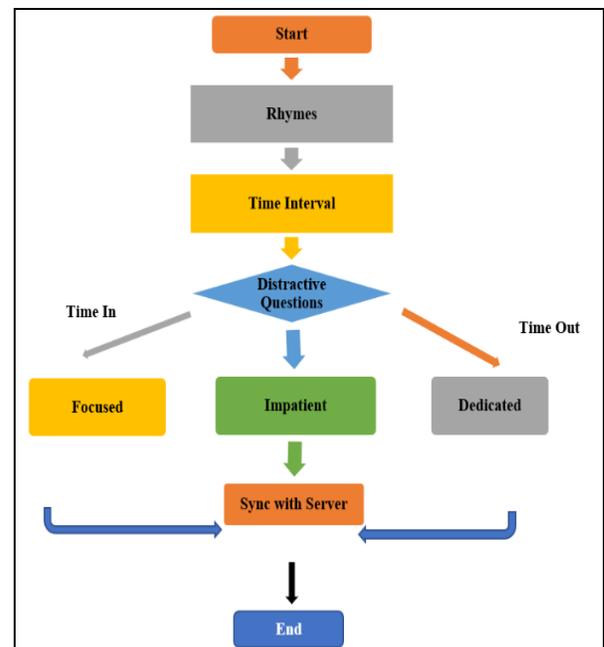


Figure. 6. Working of rhymes level in beat the clock game

Figure 7. Flowchart represents the activity Puzzle, having distractive activities which are coloring and matching objects. A child will be monitored as to what he chooses to do with these activities. Child decision and the time he takes to complete the activity determines the stage of brain development i.e., focused, impatient, or determined.

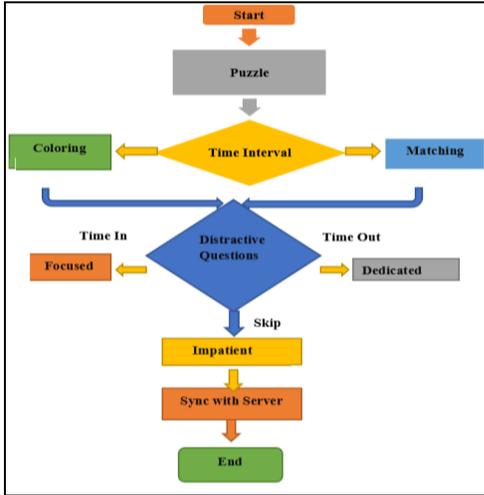


Figure. 7. Working of puzzle level in beat the clock game

C. Parent Application

Figure. 8 shows the parent’s application working flow. The child’s profile data is shown to parents. Overall child, activity is presented to parent’s applications. How many games played, most played game, etc., details are added to a child’s profile summary. Suggestions are also given based on results.



Figure. 8. Parent application working flow

VI. ANALYSIS STAGE

In this part, there will be explanations of the analysis stage and designing of child psychological tests into a learning and monitoring-based application. The below figure represents the analysis stage. The results of games will be analyzed on the responses and reactions of a child in every game. This will demonstrate how the child answers the questions that appear in between every game. The sequences of analysis are shown in Figure. 9.

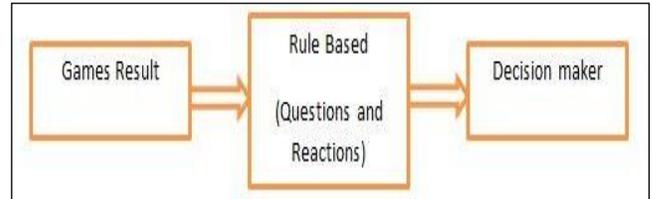


Figure. 9. Sequence of Analysis

VII. RESULT

This part will explain the result achieved after undertaking the research. The application is simulated to 3-to-9-year-old children with 27 children belongs to age group 1, 15 children come under age group 2, and 6 children are in age group 3. As shown in Table I. Thus, there are 20 children as the samples of this study.

TABLE I. SAMPLE AGE GROUP

Age Group	Number of Children
Beginner (3-5)	27
Intermediate (6-7)	15
Advance (8-9)	6

After assessing the sample of 48. The results after playing react world activity game by the different groups are shown in Table II.

TABLE II. RESULT OF REACT WORLD ACTIVITY

	Beginners	Intermediate	Advance
Shyness	6	5	2
Arrogance	5	6	3
Isolation	7	4	2
Child Abuse	7	1	0

The results from the react world activity give the prediction of about 27 percent shyness, 29 percent arrogance, 27 percent isolation, and 17 percent child abuse. These results are shown in a bar graph form in Figure.10 as follows.

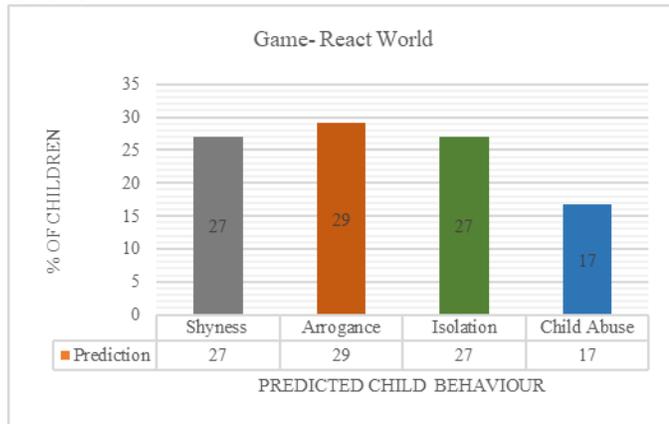


Figure. 10. Graph of results obtained from react world

The result after playing the Beat the clock activity game by the different groups is shown in Table III. Approximately 40 percent focused, 40 percent Impatient, and 21 percentage dedicated results were obtained from the beat-the-clock activity. These results are shown in a bar graph form in Figure. 11.

TABLE III BEAT THE CLOCK ACTIVITY

	Beginners	Intermediate	Advance
Focused	12	5	2
Impatient	11	5	3
Dedicated	4	5	1

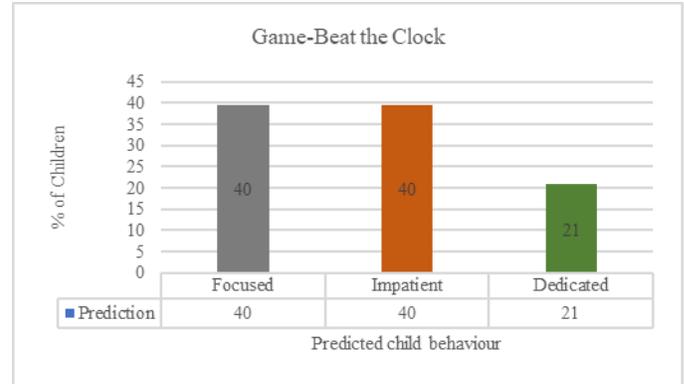


Figure. 11. Graph of Results obtained from Beat the Clock

VIII. CONCLUSION AND FUTUREWORK

Child Psychology Monitoring and Learning System brings forth many benefits to overcome emotional, behavioral, and mental issues faced by the child. Once this application is in frequent use, parents will notice that their child is showing a positive attitude towards life in the following ways: higher self-esteem, little to no stress or depression, greater involvement in school and grades, better activities, and standing firm through difficult times in life. CPMLS is also valuable for parents as it will gradually remove emotional detachment and insecurity between parent and child. Through its therapeutic approach, this application is meant to monitor and improve the psychological growth of a child for three different age groups (3-5, 6-7, and 8-9). To conclude, this world would be a much better place if the future generation's emotional, mental, and physical needs can be better identified and understood. In this way, they can live a prolific and fulfilling life.

In the future, this application can accommodate additional play therapy games that work to detect various other problems. For data analysis, videos can be made that can assist in examining and analyzing a concern faced by the child. Also, if needed, a website of this application will be built for user information.

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The preferred spelling of the word “acknowledgment” in America is without an “e” after the “g”. Avoid the stilted expression, “One of us (R.B.G.) thanks . . .” Instead, try “R.B.G. thanks”. Put applicable sponsor acknowledgments here; DO NOT place them on the first page of your paper or as a footnote.

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