GAMIFIED EDUCATION APP USING KOTLIN

A PROJECT REPORT

Submitted by

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in partial fulfillment for the award

of the degreeof

BACHELOR OF ENGINEERING

in

COMPUTER SCIENCE AND ENGINEERING

RAJALAKSHMI ENGINEERING

COLLEGEAUTONOMOUS,

CHENNAI

MAY 2024

BONAFIDE CERTIFICATE

Certified that this Thesis titled **"GAMIFIED EDUCATION APP USING KOTLIN**" is the bonafide work of "**PRIYADHARSHINI G (2116210701198),SAIKRISHNA C (2116210701219), SHREENIDHI GL (2116210701246)"** who carried out the work under my supervision. Certified furtherthat to the best of my knowledge the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred onan earlier occasion on this or any other candidate

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ACKNOWLEDGEMENT

We express our sincere thanks to our beloved and honorable chairman **MR. S. MEGANATHAN** and the chairperson **DR. M. THANGAM MEGANATHAN** for their timely support and encouragement.

We are greatly indebted to our respected and honorable principal **Dr. S.N. MURUGESAN** for his able support and guidance

No words of gratitude will suffice for the unquestioning support extended to us by our Head of The Department **Dr.P. KUMAR M.E Ph.D.,** and our Academic Head **Dr. N . DURAIMURUGAN,** for being ever supporting force during our project work

We also extend our sincere and hearty thanks to our internal guide **Mr.VIJAY.K,** for his valuable guidance and motivation during the completion of this project.

Our sincere thanks to our family members, friends and other staff members of computer science engineering.

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ABSTRACT

Autism spectrum disorder (ASD), which is a disorder associated with the development and is marked with the problems of communication, difficulties in interactions, and repetitive behaviours with the sensitivity to the sensory, is a last mentioned. It can present in different individual necessitates although separate approaches to guide education. In order to enable children with autism, we developed a quiz-based game learning program to adapt to the kids' skills, due to which the educational experience actually become personalized, as the kids learn according to their own capacities and progress. The app contains sensory-calming visuals and a user-friendly interface for distraction-prevention purposes and it is accompanied by the soft sounds and the stimulus that are smoothly matched with the images and are not intrusive. The interactive application is centred around the visual supports that give the students tools to increase their comprehension and communication capabilities. These instruments make children to possess critical social skills and to be able to relate with and interact with other children. Instant feedback and praise for the quizzes prove more effective in fixing the mind firmly to the retention of learning and as motivation booster, the children are made to be rewarded while they are achieving. It provides an ideally suited intervention and tool for students with autism by focusing on their specific difficulties and offering acceptance and good support in immersive learning environment. They sharpen interaction, promote interaction and new social skills as well and boost learning effectiveness. Through this great example we are able to see an application of technology for educational aids that provide fun and learn to kids with autism promoting equality and inclusive education.

1. INTRODUCTION

1.1. INTRODUCTION

E-learning can also be termed as a network enabled transfer of skills and knowledge, and the delivery of education is made to a large number of recipients at the same or different times. Earlier, it was not accepted wholeheartedly as it was assumed that this system lacked the human element required in learning. Books are gradually getting replaced by electronic educational materials like optical discs or pen drives. Knowledge can also be shared via the Internet, which is accessible 24/7, anywhere, anytime. Technology is making the education industry improve over time. With technology, students and parents have a variety of learning tools at their fingertips. Teachers can coordinate with classrooms across the world and share their ideas and resources online. Students can get immediate access to an abundance of good information on the Internet. Teachers and students can access plenty of resources available on the web and utilise them for their project work, research, etc. Online learning has changed our perception of education.

E-learning through mobile game application is basically associated with game-based learning. Educational games have been described as applications which use video-related mobile game features to build engaging and immersive learning experiences with specific goals. These games generate challenges, promote different levels of communication and provide fun multimedia and immediate feedback. Letting the players take advantage of the gameplay to achieve certain goals would make the players be more motivated to play the game as the rule will ultimately make them feel better once the goal is achieved. Integration of technology in education simply refers to the use of technology to enhance the student learning experience. Utilizing different types of technology in the

classroom creates learners who are actively engaged with learning objectives. The implementation of technology also creates pathways for differentiated instruction to meet the unique needs of students as individual learners within a broader classroom climate. Educational apps in the classroom like Kahoot can be used to review information after a lesson or unit. Teachers can create and share Kahoot with one another while students can create anonymous user names to participate in the game. This allows for whole-class participation from students who may usually be reluctant to participate in class. Kahoot is accessible to play on phones or computers and teachers can determine if they want students to work independently or be assigned to teams.

The use of technology in education also gives students ownership over how they learn, making education relevant to their digital lives. With access to devices and digital resources both in and outside the classroom, students are inspired to become problem-solvers, critical thinkers, collaborators, and creators—and develop a lifelong love of learning. Access to new digital learning tools, such as AI-based applications that adjust question sets and feedback based on student answers or PC-based VR learning opportunities, can help increase student engagement while simultaneously supporting academic development. The COVID-19 pandemic has further boosted the popularity of online education in India. With schools and colleges closed across the country, students have turned to online platforms to continue their studies. Many educational institutes have quickly adapted to this new reality and are now offering online coursesWith more people having access to quality education, the country is on its way to becoming a knowledge powerhouse.

1.2. SCOPE OF THE WORK

1. Needs Assessment and Design:

Conduct comprehensive research to understand the educational needs and challenges of disabled students through surveys and interviews.Develop an inclusive design framework that accommodates a wide range of disabilities and integrates assistive technologies**.**

2. Development and Integration:

Create adaptive learning pathways and multimodal content delivery (visual, auditory, and tactile) to personalize educational experiences.Implement gamification elements such as rewards, challenges, and feedback loops to enhance engagement and motivation.

3. UI/UX Design and Accessibility:

Design an intuitive, accessible user interface that complies with accessibility standards and undergoes usability testing with disabled students.

4. Pilot Testing and Evaluation:

Conduct pilot tests with a diverse group of disabled students to evaluate effectiveness, gather feedback, and refine the app based on real-world use.

5. Implementation, Scalability, and Continuous Improvement:

Develop an implementation plan including training for educators, strategies for scaling, and establishing a feedback loop for ongoing improvements and support.

1.3. PROBLEM STATEMENT

Disabled students often face significant barriers in traditional educational environments, limiting their engagement, motivation, and academic success. Conventional educational tools frequently lack the necessary adaptations and inclusivity to address diverse needs. The challenge is to develop a gamified education app that provides a personalized, engaging, and accessible learning experience for students with physical, cognitive, and sensory disabilities, enhancing their educational outcomes and fostering an inclusive, supportive learning environment. This requires innovative design, adaptive content, and assistive technologies.

1.4. AIM AND OBJECTIVES OF THE PROJECT

To develop a gamified education app using Kotlin and Firebase that enhances educational outcomes and fosters an inclusive learning environment for students with physical, cognitive, and sensory disabilities through personalized, engaging, and accessible learning experiences.

The objectives are as follows,

1. **Conduct Needs Assessment:**

   Identify the educational needs and challenges of disabled students through surveys and interviews with students, educators, and caregivers.

2. **Develop Adaptive Learning and Gamification:**

   Create adaptive learning pathways and integrate gamification elements, such as rewards and challenges, to enhance engagement and motivation.

3. **Design Accessible UI/UX:**

   Develop an intuitive, accessible user interface that meets accessibility standards and ensure usability through testing with disabled students.

4. **Integrate Firebase:**

Use Firebase for realtime data synchronization, user authentication, and secure storage of educational content and user progress.

5. **Pilot Test and Refine:**

Conduct pilot testing with a diverse group of disabled students to evaluate effectiveness, gather feedback, and refine the app based on real world use.

6. Implement and Scale:

Create an implementation plan, including educator training and support, and develop strategies for scaling the app to a larger population and integrating it into existing educational systems.

7. Ensure Continuous Improvement:

Establish a feedback loop for continuous improvement based on user feedback and technological advancements, providing ongoing technical support and regular updates.

2. LITERATURE SURVEY

2.1 Engaging Students with Intellectual Disabilities through Games Based Learning and Related Technologies(2013)

This study by Brown et al. (2013) discusses the challenges faced by educators in engaging students with intellectual disabilities and proposes gamesbased learning (GBL) and related technologies as promising solutions. It explores specific examples of GBL interventions tailored to the needs of students with intellectual disabilities, emphasizing the potential benefits for enhancing motivation, skill development, and overall learning outcomes in this population.

2.2 Serious Gamebased Intervention for Children with Developmental Disabilities(2020)

Kokol et al. (2020) present a comprehensive investigation into serious gamebased interventions targeting children with developmental disabilities. The study delves into the design, implementation, and evaluation of serious games as therapeutic tools to address various cognitive, emotional, and behavioral challenges faced by children with developmental disorders. It highlights the importance of personalized and engaging interventions in promoting positive developmental outcomes and improving the quality of life for these children and their families**.**

2.3 Using the concept of GameBased Learning in education(2020)

Liu et al. (2020) provide an indepth exploration of the concept of gamebased learning (GBL) and its applications in educational settings. The paper offers a theoretical framework for understanding GBL principles and discusses practical strategies for integrating GBL into traditional instructional practices. It

emphasizes the potential of GBL to enhance student engagement, motivation, and learning outcomes across various educational contexts, including K12 schools, higher education institutions, and corporate training programs.

2.3 Mobile GameBased Learning with a Mobile App: Motivational Effects and Learning Performance(2017)

Huang et al. (2017) investigate the motivational effects and learning performance associated with mobile game based learning using a mobile app platform. The study employs rigorous experimental methods to assess the impact of mobile games on student engagement, motivation, and academic achievement. It provides valuable insights into the design features, pedagogical strategies, and implementation considerations for mobile game based learning initiatives, highlighting their potential to transform traditional teaching and learning practices in the digital age.

2.4 Putting education in "Educational" apps(2015)

Hirsh-Pasek et al. (2015) critically examine the design and effectiveness of educational apps in promoting meaningful learning experiences for users. Drawing on principles from developmental psychology, educational theory, and human computer interaction, the paper offers guidelines for designing high quality educational apps that align with learning objectives, foster active engagement, and support knowledge acquisition and retention. It underscores the importance of evidence based design principles and user centered approaches in creating educational apps that truly enhance learning outcomes and empower learners of all ages.

2.5 Education 2.0: ELearning Methods(2015)

Tîrziu and Vrabie (2015) explore the paradigm shift towards Education 2.0, characterized by the integration of innovative e-learning methods and

collaborative technologies in educational practices. The paper reviews emerging trends in online education, including massive open online courses (MOOCs), social learning platforms, and personalized learning environments. It discusses the potential benefits and challenges of Education 2.0 approaches, highlighting opportunities for expanding access to quality education, fostering lifelong learning skills, and promoting global collaboration and knowledge sharing in the digital age.

2.6 Education 2.0(2015)

Waks (2015) offers a comprehensive overview of the Education 2.0 movement, which advocates for the transformation of traditional educational models through the strategic integration of technology, social networking, and participatory learning strategies. The paper explores the theoretical underpinnings of Education 2.0, emphasizing its potential to democratize education, empower learners as active agents of knowledge creation, and foster collaborative learning communities across geographical and disciplinary boundaries. It discusses practical examples of Education 2.0 initiatives and their implications for educational policy, pedagogy, and institutional practice.

2.7 Learning through computer based concept mapping with scaffolding aid(2001)

Chang et al. (2001) investigate the effectiveness of computer based concept mapping with scaffolding aid as a cognitive learning tool. The study explores how computer based concept mapping activities can scaffold students' cognitive processes, facilitate knowledge construction, and promote meaningful learning experiences. It provides insights into the design and implementation of computer based scaffolding strategies to support concept mapping tasks across various educational domains and age groups.

2.8 Beyond Universal Design for Learning: Guiding Principles to Reduce Barriers to Digital & Media Literacy Competence(2017)

Dalton (2017) presents guiding principles for reducing barriers to digital and media literacy competence in educational contexts. Building upon the framework of Universal Design for Learning (UDL), the paper offers practical strategies for promoting digital literacy skills, addressing accessibility challenges, and fostering inclusive learning environments for diverse learners. It underscores the importance of adopting proactive and holistic approaches to digital and media literacy education, with a focus on equity, accessibility, and social justice.

2.9 The role of gamified e-quizzes on student learning and engagement: An interactive gamification solution for a formative assessment system(2020)

Zainuddin et al. (2020) examine the role of gamified e-quizzes in promoting student learning and engagement in formative assessment practices. The study investigates the design features, pedagogical affordances, and motivational effects of gamified e-quizzes as interactive learning tools. It provides empirical evidence supporting the use of gamification techniques to enhance student motivation, participation, and academic performance in formative assessment tasks. The paper offers practical recommendations for integrating gamified e-quizzes into educational settings to enrich the learning experience and foster a culture of continuous improvement and feedback.

2.10 Gamification in the classroom: Examining the impact of gamified quizzes on student learning(2020)

Sanchez et al. (2020) explore the impact of gamified quizzes on student learning outcomes in the classroom. Drawing on principles from educational psychology and game design, the study investigates the effects of gamification strategies on student motivation, engagement, and academic achievement. It provides empirical insights into the effectiveness of gamified quizzes as formative assessment tools, highlighting their potential to enhance learning

experiences, promote masteryoriented learning behaviors, and improve student outcomes across diverse educational contexts.

2.11 The gamification of learning: A meta analysis(2020)

Sailer and Homner (2020) conduct a meta analysis of studies on the gamification of learning to examine its overall impact on learning outcomes and student engagement. Synthesizing findings from empirical research across multiple disciplines, the paper offers a comprehensive overview of the effects of gamification techniques on various aspects of learning and motivation. It identifies key moderators and mediators of gamification effects, explores potential mechanisms underlying gamified learning experiences, and discusses implications for theory, research, and practice in educational gamification.

3. SYSTEM SPECIFICATIONS

3.1 HARDWARE SPECIFICATIONS

Processor	:	Intel i5
Memory Size	:	8GB (Minimum)
HDD	:	1 TB (Minimum)

3.2 SOFTWARE SPECIFICATIONS

Operating System	:	WINDOWS 10
Front – End	:	Kotlin
Back - End	:	Kotlin
Database	:	Firebase

4. PROPOSED SYSTEM

Purpose and Mission:

The gamified app, built on Kotlin and Firebase, is dedicated to enhancing the educational experience of disabled students. By leveraging gamification principles and innovative technology, the app aims to foster engagement, accessibility, and personalized learning, empowering disabled students to thrive academically.

Technology Stack:

Utilizing Kotlin for the app's development ensures a robust, efficient, and user-friendly experience, while Firebase serves as the backend, providing seamless data management, real-time synchronization, and scalable cloud services, all tailored to the unique needs of disabled students.

Student Interaction:

Disabled students can actively engage with gamified learning activities tailored to their abilities and preferences. The app offers a variety of interactive modules, challenges, and adaptive learning pathways designed to cater to diverse learning styles and needs.

Adaptive Learning Paths:

The app dynamically adjusts learning paths based on individual student progress and performance data stored in Firebase. This personalized approach ensures that disabled students receive tailored support and resources to optimize their learning outcomes.

Accessibility Features:

Accessibility is a key focus of the app, with features such as screen reader compatibility, customizable interfaces, and support for assistive technologies built into the Kotlin frontend. Firebase's real-time database capabilities enable seamless synchronization of accessibility preferences across devices.

Social Interaction:

Disabled students can connect and collaborate with peers through social features powered by Firebase, including multiplayer games, group projects, and discussion forums. These interactive experiences promote inclusivity and foster a sense of community among students.

Awareness and Education:

The app serves as an educational tool, raising awareness of disability-related challenges and promoting understanding and empathy among users. Through informative content and engaging experiences, students gain insight into the importance of inclusive education and accessibility.

Community Impact:

By providing a platform for disabled students to connect, learn, and support each other, the app contributes to the creation of a more inclusive and supportive learning community. Firebase's scalability ensures that the app can reach and impact a wide audience of disabled students and educators.

Feedback Mechanism:

Disabled students are encouraged to provide feedback and suggestions through the app, facilitated by Firebase's real-time data processing capabilities. This feedback loop enables continuous improvement of features and ensures that the app evolves to meet the evolving needs of disabled students.

5. MODULE DESCRIPTION

5.1. USER REGISTRATION AND LOGIN MODULE

The User Registration and Login Module of the quiz-based learning app, developed using Kotlin for both frontend and backend, seamlessly integrates Firebase for database services. Users can register, log in securely, and access personalized content via intuitive interfaces such as the Registration, Login. Firebase Authentication ensures robust user authentication, password hashing, and session management, while Firebase Database securely stores user credentials and profiles. The module emphasizes data security leveraging Kotlin's capabilities and Firebase's authentication features to deliver a seamless and secure user authentication process within the app.

5.2. PROFILE CREATION MODULE

The users can create a profile in this application by giving their details like. After entering, their details will be stored in the Database.

5.3. DASHBOARD MODULE

The grid view in the quiz-based learning app presents a comprehensive list of available quizzes, organized for easy navigation and access. Each quiz is displayed with relevant information such as title, subject, and difficulty level, allowing users to quickly identify and select quizzes based on their preferences and learning goals. Additionally, the inclusion of a dedicated

"Learning Module" button within the grid view provides users with a seamless transition to active learning mode, where they can engage with interactive educational content, reinforcing concepts learned from quizzes and promoting continuous learning. The grid's intuitive design and functionality enhance user engagement and facilitate a structured learning experience within the app.

5.4. QUIZ AND RESULT MODULE

The quiz module within the learning app features intuitive navigation controls, including "Previous" and "Next" buttons, allowing users to move between quiz questions efficiently. A "Submit" button enables users to finalize their answers and submit the quiz for evaluation. Upon completion, the result module displays the user's score, correct and incorrect answers, and provides detailed feedback on their performance. This comprehensive quiz module enhances user interaction, promotes active learning, and offers valuable insights into user progress and understanding of the quiz content.

5.5. TEXT TO SPEECH ENABLED LEARNING MODULE

The The text-to-speech (TTS) conversion module integrated into all learning modules within the app enhances accessibility and learning engagement for users. This feature enables the app to convert text-based learning content into spoken audio, allowing users to listen to the content instead of reading it.. This module benefits users with visual impairments, reading difficulties, or those who prefer auditory learning methods. By incorporating TTS technology, the app promotes inclusivity, improves comprehension, and enhances the overall learning experience for all users.

6. SYSTEM ARCHITECTURE

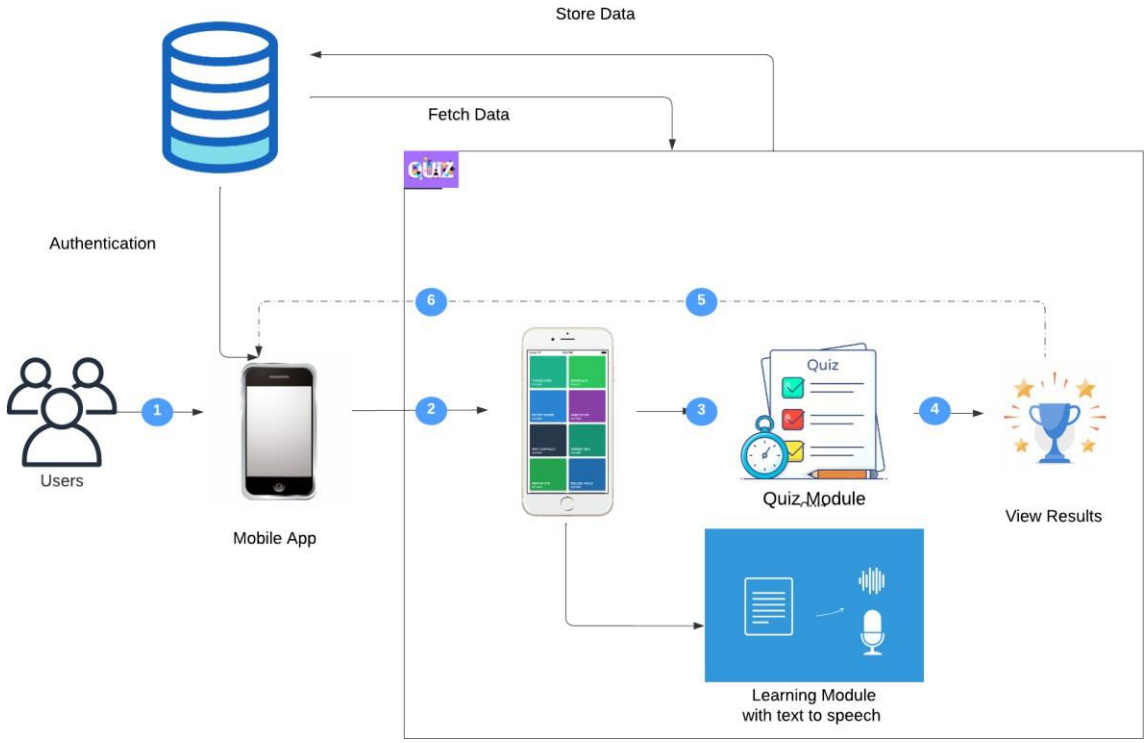

Fig 6.1 System Architecture diagram

The quiz-based learning app for children with autism features a comprehensive system architecture that ensures a seamless and personalized user experience. The user interface includes login/sign-up screens, a home screen for daily quizzes, a quiz screen for answering questions, a learning module screen with text-to-speech (TTS) functionality, and a profile screen for user information. The backend services include an Authentication Service for secure login, a Quiz Management Service for handling quizzes, a Learning Module Service integrated with TTS for

converting text to speech, a User Profile Service for managing user data, and a Notification Service for sending reminders and updates. The TTS Service, crucial for the learning module, offers customizable voices and speeds. The database system comprises a User Database for credentials and profiles, a Quiz Database for questions and progress, a Learning Content Database for educational materials, and an Analytics Database for tracking performance. This architecture uses Kotlin for the frontend, kotlin for the backend, Firebase for data storage, Firebase Authentication for user authentication, and Text-to-Speech, hosted on AWS or Google Cloud for scalability. This robust and scalable architecture enhances engagement, learning outcomes.

The "Viewing the Result" feature allows users to review their quiz performance, track their progress over time, and receive feedback on their learning journey. This feature is crucial for reinforcing learning, identifying areas for improvement, and providing motivation through positive reinforcement and provides a supportive educational environment tailored to the unique needs of children with autism.

7. SAMPLE CODING

MainActivity.kt:

```
package com.example.quizzer.activities

import android.content.Intent
import android.graphics.drawable.GradientDrawable
import androidx.appcompat.app.AppCompatActivity
import android.os.Bundle
import android.util.Log
import android.view.MenuItem
import android.widget.Button
import android.widget.Toolbar
import androidx.appcompat.app.ActionBarDrawerToggle
import androidx.drawerlayout.widget.DrawerLayout
import androidx.recyclerview.widget.GridLayoutManager
import androidx.recyclerview.widget.RecyclerView
import com.example.quizzer.R
import com.example.quizzer.activities.ProfileActivity
import com.example.quizzer.activities.QuestionActivity
import com.example.quizzer.adapters.QuizAdapter
import com.example.quizzer.models.Quiz
import com.google.android.material.datepicker.MaterialDatePicker
import com.google.android.material.floatingactionbutton.FloatingActionButton
import com.google.android.material.navigation.NavigationView
import com.google.firebase.firestore.FirebaseFirestore
import java.text.SimpleDateFormat
import java.util.*
```

```
class MainActivity  : AppCompatActivity() {

    private lateinit var quizRecyclerView: RecyclerView
    private lateinit var actionBarDrawerToggle: ActionBarDrawerToggle
    private  lateinit var adapter: QuizAdapter
    private var quizList = mutableListOf<Quiz>()
    private var firestore: FirebaseFirestore?=null
    private var appBar: androidx.appcompat.widget.Toolbar?=null
    private var mainDrawer: DrawerLayout?=null
    private var navigationView: NavigationView?=null
    private  var btnDatePicker: FloatingActionButton? = null

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)

         setContentView(R.layout.activity_main)

        // Initialize views
        appBar =
findViewById<androidx.appcompat.widget.Toolbar>(R.id.appBar)
        mainDrawer = findViewById<DrawerLayout>(R.id.mainDrawer)
        navigationView = findViewById<NavigationView>(R.id.navigationView)
        quizRecyclerView =
findViewById<RecyclerView>(R.id.quizRecyclerView)
        btnDatePicker =
findViewById<FloatingActionButton>(R.id.btnDatePicker)

        setUpViews()
```

```
}

private fun setUpViews() {
    setUpFireStore()
    setUpDrawerLayout()
    setUpRecyclerView()
    setUpDatePicker()
}

private fun setUpDatePicker() {
    btnDatePicker?.setOnClickListener {
        val datePicker = MaterialDatePicker.Builder.datePicker().build()
        datePicker.show(supportFragmentManager, "DatePicker")
        datePicker.addOnPositiveButtonClickListener {
            Log.d("DATEPICKER", datePicker.headerText)
            val dateFormatter = SimpleDateFormat("dd-MM-yyyy")
            val date:String = dateFormatter.format(Date(it))
            val intent = Intent(this, QuestionActivity::class.java)
            intent.putExtra("DATE", date)
            startActivity(intent)
        }
        datePicker.addOnNegativeButtonClickListener {
            Log.d("DATEPICKER", datePicker.headerText)
        }
        datePicker.addOnCancelListener {
            Log.d("DATEPICKER", "Date Picker Cancelled")
        }
    }
}
```

```
    private fun setUpFireStore() {
        firestore = FirebaseFirestore.getInstance()
        val collectionReference = firestore?.collection("quizzes")
        if (collectionReference != null) {
            collectionReference.addSnapshotListener { value, error ->
                if (value == null || error != null) {
                    // Handle error
                    return@addSnapshotListener
                }
                quizList.clear()
                quizList.addAll(value.toObjects(Quiz::class.java))
                adapter?.notifyDataSetChanged()
            }
        }
    }

    private fun setUpRecyclerView() {
        adapter = QuizAdapter(this, quizList)
        quizRecyclerView.layoutManager = GridLayoutManager(this, 2)
        quizRecyclerView.adapter = adapter
    }

    private fun setUpDrawerLayout() {
        setSupportActionBar(appBar)
        actionBarDrawerToggle =
            ActionBarDrawerToggle(this, mainDrawer, R.string.app_name,
R.string.app_name)
        actionBarDrawerToggle.syncState()
```

```
        navigationView?.setNavigationItemSelectedListener {
            val intent = Intent(this, ProfileActivity::class.java)
            startActivity(intent)
            mainDrawer?.closeDrawers()
            true
        }
    }

    override fun onOptionsItemSelected(item: MenuItem): Boolean {
        if (actionBarDrawerToggle.onOptionsItemSelected(item)) {
            return true
        }
        return super.onOptionsItemSelected(item)
    }
}
```

8. OUTPUT

The users can create an account in this application by giving their email id, password. The password is encrypted. After a user is registered. The user gets access to all quizzes and learning modules.

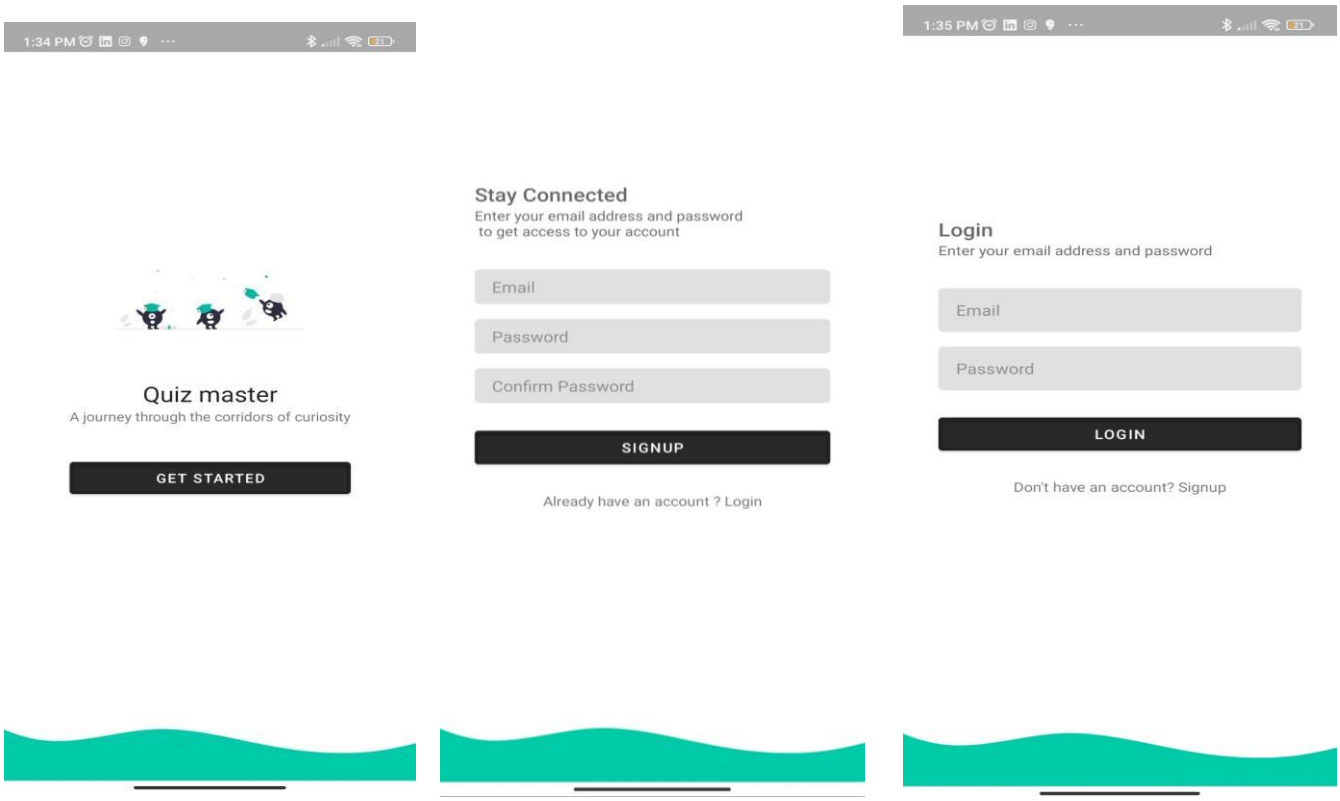

Fig 8.1 User Registration and Login Page

(The user can register in this page by entering their email id, password and role)

The users can view their profile in this application. And can choose to log out of the application in the main profile page. Fig 8.2 show the Drawer view page and the profile page of the application.

Fig 8.2 Profile Page

(Users can create view their profile)

The grid view has two modes quiz or learning module. The quiz module lists all the quiz that is scheduled. The Quiz is posted daily and the user can view the quiz that has been posted.The learning module consists of the learning pathway. The learning pathway has covered various subjects.

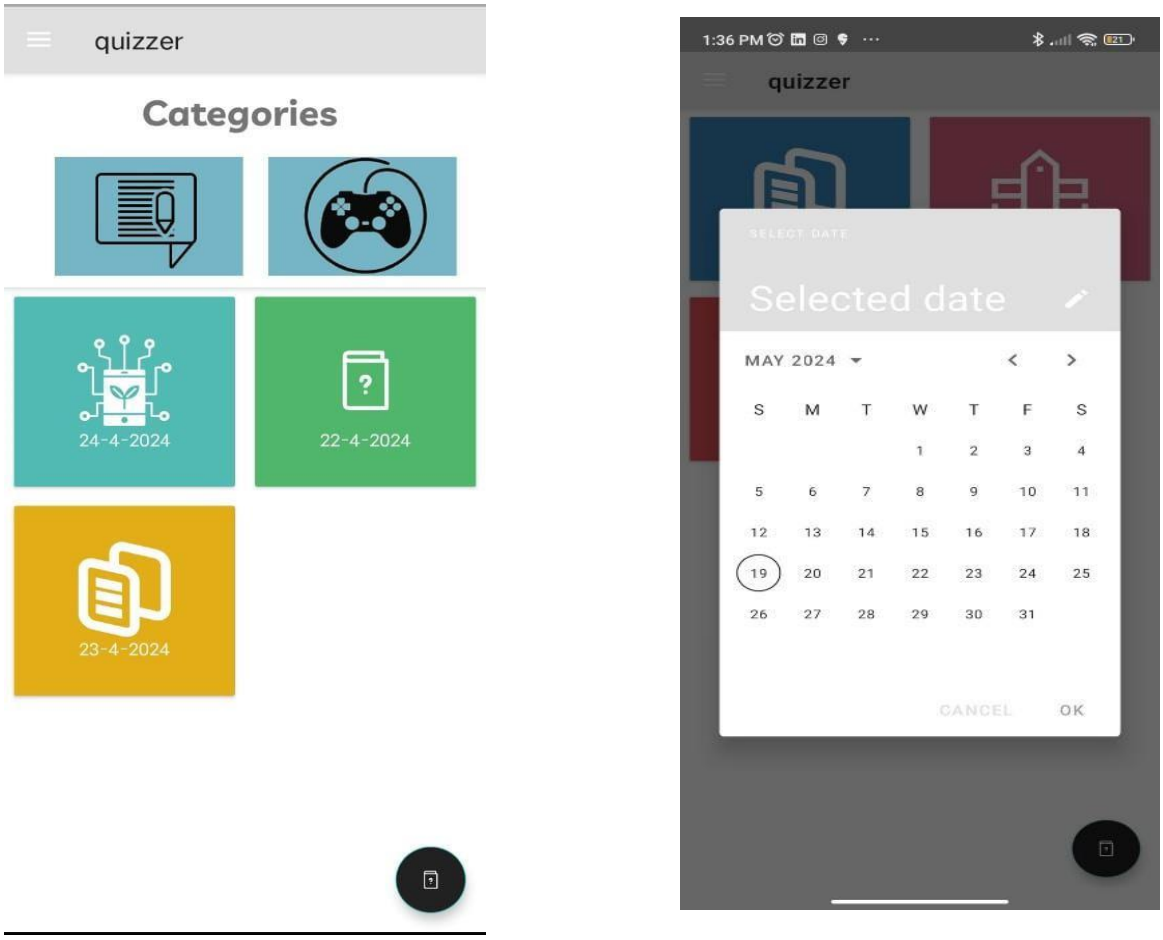

Fig 8.3 Grid view (All the quizzes are listed in this page along with navigation to learning pathway.)

Creating a quiz module with "Previous," "Next," and "Submit" buttons involves designing an intuitive user interface that allows users to navigate through questions easily, review their answers, and submit the quiz when they are done. Fig 8.4 and Fig 8.5 detailed outline of the features and functionality.

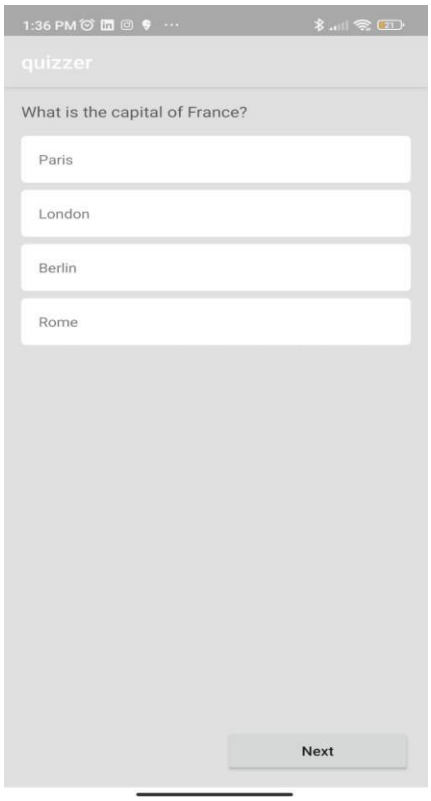

Fig 8.4 Quiz Page (The first page of the next button)

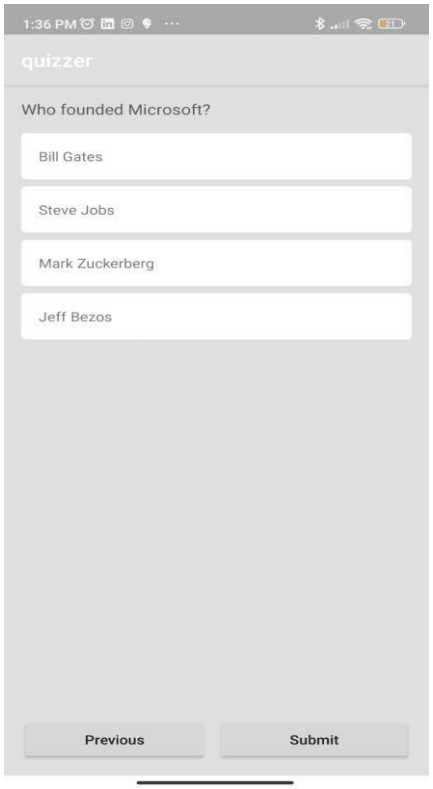

Fig 8.5 Quiz (last page with previous and submit button)

The Creating a results section for a quiz app involves detailing various aspects that inform the user of their performance and provide feedback for improvement. Fig 8.6 shows a comprehensive outline and description for the results section of a quiz app.

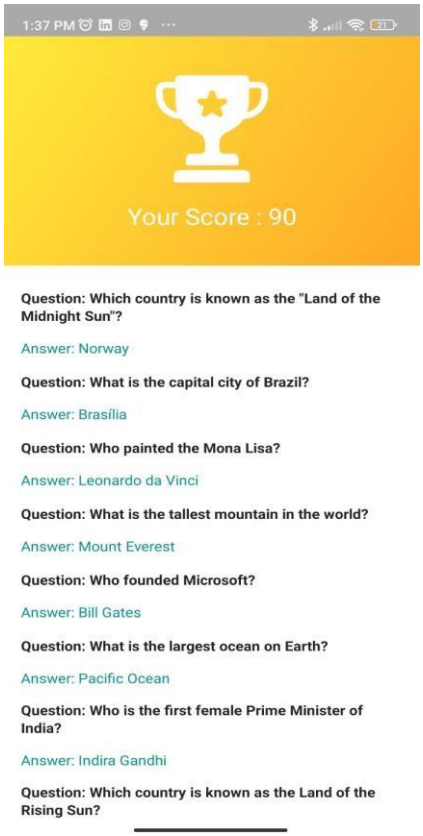

Fig 8.6 Result view (The user can see their score after completion of the quiz.)

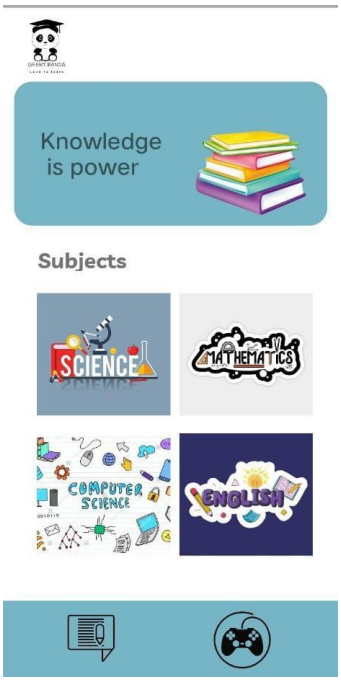

Fig 8.7 The figure shows the learning pathway.

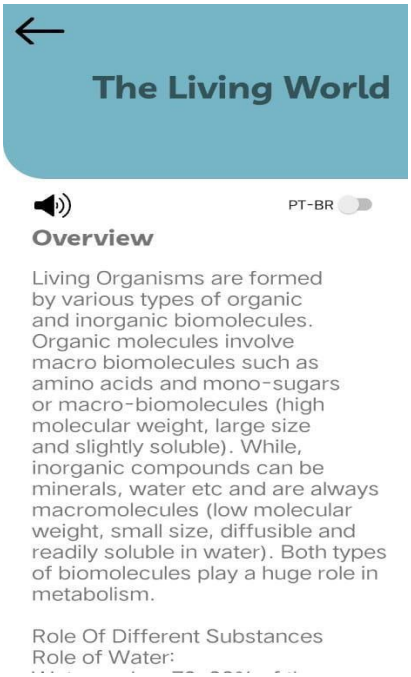

Fig 8.8 shows the text to speech Module

Fig 8.7shows the learning module, Fig 8.8 shows the text to speech module for the given learning content.

9. CONCLUSION AND FUTURE ENHANCEMENT

The gamified app, powered by Kotlin and Firebase, has significantly improved inclusive education by offering engaging, accessible, and personalized learning experiences for disabled students. Future enhancements include advanced adaptive learning algorithms, expanded accessibility features, and deeper community engagement initiatives. By leveraging technology and user feedback, the app is poised to become a premier platform for inclusive education, empowering disabled students globally to thrive academically and fostering a supportive learning environment for all.

10. REFERENCES

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