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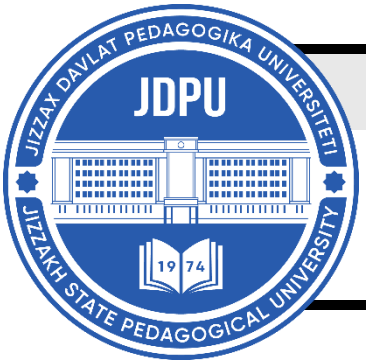

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REFORMS IN THE EDUCATIONAL PROCESS AND USING FLUTTER TO CREATE MOBILE APPLICATIONS

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ABOUT ARTICLE

Key words: educational reforms, online education, mobile technologies, mobile applications, Flutter framework, Flutter widgets, e-learning platforms.

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Abstract: The importance of digital educational resources in school education is very great, which serves to improve the quality of the educational process, enhance interactivity and personal development of students. This ensures interactivity and visual presentation of education, that is, digital educational resources (video lessons, animations, simulations) help students understand complex concepts in a visual and practical way, which is especially effective in STEM subjects (mathematics, physics, chemistry, biology). This article presents the reforms in the educational process, the work being carried out in our republic and the use of Flutter in creating mobile applications, the sequence of using Flutter widgets in creating mobile applications.

Introduction

An analysis of the reforms implemented in the education system in the country in a historically short period of time shows that positive trends have emerged. The approach to the education sector has changed radically. In particular, “the development of school education under the slogan “New Uzbekistan begins at the school threshold” has become a nationwide movement. The workload in schools has been optimized, and the practice of involving teachers in forced labor has been abolished. In this regard, traditional approaches have been abandoned, and modern technologies and advanced foreign experience have been actively introduced.

The basis of the reforms in the education system was to raise the status of teachers in society and radically change the attitude towards them. In this regard, material support for teachers was provided, including the provision of preferential loans to them, and the introduction of bonuses for teachers working in remote regions” [1].

Materials and methods

Today, under the leadership of the President of the Republic of Uzbekistan, comprehensive strategic reforms are being implemented in the education system of the Republic of Uzbekistan. Current tasks in the field are reflected in conceptual and strategic documents. In particular, the Development Strategy of New Uzbekistan for 2022-2026, the Strategy "Uzbekistan - 2030" and related programs.

In particular, the “Digital Uzbekistan – 2030” strategy was approved by the Decree of the President of the Republic of Uzbekistan No. PF-6079 dated October 5, 2020, which is a comprehensive document aimed at accelerating the digital economy, information and communication technologies (ICT) and the digitalization of the education system in the country. This strategy includes the following main areas for the development of Internet infrastructure, training personnel in the ICT sector and digitalization of the education system:

- it is planned to establish centers for the provision and export of remote services using ICT in the regions. This is intended to develop IT outsourcing services and strengthen local infrastructure;

- it is planned to organize ICT training courses for students in grades 5–11 of general education schools by establishing digital technology training centers in each city and district;

- it is aimed at improving the quality of computer science education by encouraging the active participation of organizations in the field of information technology in the educational process;

- it is planned to improve digital governance in the education sector by creating an information system for managing access rights to information systems for employees of the education inspectorate [3].

In order to address this issue, a new program is being implemented starting in 2023. According to it, European vocational education standards have been introduced in 1 technical school in each region. In the next five years, all colleges and technical schools will be covered by this system.

At the same time, branches of more than 30 prestigious higher education institutions from foreign countries (USA, Great Britain, Italy, Finland, Korea, India, Singapore, Russia, etc.) have been opened in Uzbekistan.

In general, as a result of the reforms, the number of students studying in higher education institutions has increased by 2.2 times. In particular, in 2016, 268.3 thousand students studied, while in 2023 their number reached 1.03 million. people.

As a logical continuation of the work in this regard, it is planned to launch the Presidential Schools educational program in another thousand schools in 2024.

Also, the country has launched the activities of Creative Schools, specialized schools named after Abu Ali Ibn Sino, M. Ulugbek, and Muhammad al-Khwarizmi.

One of the latest reforms aimed at further improving the country's education system was the adoption of the Resolution of the President of the Republic of Uzbekistan "On Additional Measures to Accelerate Reforms in the Education Sector" (No. PQ-54 dated 02.02.2024).

According to the resolution, the main areas of activity of the Project Office were determined as follows:

– development of measures and promising initiatives to reform the education sector;

– updating the curricula and programs in mathematics, physics, chemistry, biology and foreign languages in schools based on international standards;

– development of teaching methodologies aimed at developing students' knowledge, analytical, critical and creative thinking, problem-solving skills and practical application.

– gradual introduction of recognized foreign programs (such as A-level, IB), international experiences in assessing the knowledge of students and teachers (PISA, TIMSS, PIRLS);

– strengthening international relations in the field of education quality control, expanding cooperation with foreign and international assessment organizations.

The importance of digital educational resources in school education is very great, as they serve to improve the quality of the educational process, enhance interactivity, and promote the personal development of students. This ensures interactivity and visual presentation of education, that is, digital educational resources (video lessons, animations, simulations) help students understand complex concepts in a visual and practical way, which is especially effective in STEM subjects (mathematics, physics, chemistry, biology).

The possibility of an individual approach also increases, that is, tasks and resources can be provided that are adapted to the level of knowledge of each student, and programs adapted for children with special needs allow them to receive equal education.

Digital educational resources include online lessons, video tutorials, electronic tests, interactive simulations, and gamified learning platforms.

Mobile technologies are a system of technologies that provide information exchange, processing, and management using wireless communication and portable devices.

Mobile Application is a software application designed to run on a smartphone, tablet or other mobile device. Mobile applications allow users to communicate, receive information, play games, conduct business, get education and perform various other tasks.

According to the UN's "World Population Prospects" report, there are 8.2 billion people living on Earth today. Over the year, the world's population increased by 70 million people, which corresponds to an annual growth rate of 0.9%.

The number of unique mobile phone users at the beginning of 2025 was 5.78 billion. According to the latest data from GSMA Intelligence, today 70.5% of people in the world use mobile devices. Since the beginning of 2024, the total number of mobile users has grown by 112 million (+2.0%). At the same time, smartphones now account for 87% of all mobile devices in the world.

More than 67.9% of the entire population of our planet uses the Internet, and according to the latest data, the total number of Internet users in the world at the beginning of the year was 5.56 billion. Over the past 12 months, it has increased by 2.5% (136 million new users since the beginning of 2024).

According to Kepios, the number of social media user profiles has exceeded 5.24 billion, which is equivalent to 63.9% of the world's population [note: social media user profiles are not necessarily unique users]. Over the past year, this figure has increased by 206 million, an annual growth rate of 4.1% [16].

By the 2020s, the mobile application market was already developed and continues to grow. Revenue from Android and iOS applications reached $ 111 billion in 2020, which is 24% more than in the same period last year. iOS accounted for 65% of total app revenue in 2020. Games accounted for 71% of total app revenue in 2020. iOS generated $47.6 billion in gaming revenue in 2020, while Google Play generated $31.9 billion. TikTok was the highest-grossing app in 2020, and PUBG Mobile was the highest-grossing game.

Mobile apps can be divided into:

Native apps, which are pre-installed or downloaded but are originally designed for a specific operating system or device. An app written for a device with Apple firmware will not run on a device with Android firmware. Therefore, many developers prepare software products in the form of packages for multiple operating systems.

Web apps. Web apps that are special instances of a mobile browser for viewing specially designed mobile sites. They work in web programming languages: HTML markup, formal CSS and embedded JavaScript. The advantage is that applications are independent of the device's operating system, since the data is mainly stored "in the cloud" and processed using World Wide Web resources. The disadvantage is that they are slower than the corresponding native applications.

Hybrid applications. Hybrid applications are a mixture of the two approaches described above. Hybrid applications are created using the WebView component. Webview applications are mobile versions of websites displayed in the mobile application interface. Webview applications are available on Android (Android WebView Media Integrity) and iOS platforms. Such an application can display a site created using web application technology. For the user, such an application looks native and has all the necessary functionality. For the developer, using this technology reduces the cost of writing separate code for the mobile application, since the site already provides all the necessary functionality using web application technology. Web view apps can also take advantage of iOS and Android's push notifications, payments via GooglePay or ApplePay, and many other features. These sub-types of apps are developed using frameworks such as Cordova, Flutter, React Native, and others.

Cross-platform apps. These types of apps are sometimes confused with hybrid apps. These apps are developed using cross-platform frameworks such as React Native (JavaScript), Flutter (Dart), Ionic (JavaScript), Xamarin (.NET and C#), and have common code for both iOS and Android.

Results and discussion

Flutter is a popular cross-platform application development framework. Google has created a set of open-source tools that allow developers to create applications for iOS, Android, Windows, Mac, Linux, and the web using the Dart programming language. This means that one code is written for all platforms.

The Flutter framework is written in the Dart programming language. It is a fast and intuitive language that makes it easy for developers to adapt. And with the help of JIT compilation (Just - in - Time), you can change the code and see the changes immediately, which speeds up the workflow.

Unlike many other frameworks, Flutter has a unique approach to creating user interfaces.

Flutter has developed rapidly. It has been constantly improved, allowing it to take the lead in application development. To assess its current state, let's look at the evolution since the creation of this innovative framework.

Introduced in 2015 under the name Flutter Sky. It was primarily aimed at achieving high performance and rendering quality. It was designed to develop Android application interfaces that run at 120 frames per second. This became the basis of what we know today as Flutter, a framework that still cares about performance and UI perfection.

In May 2017, Flutter was first presented at the Google Developer conference I/O. The main efforts of the developers were aimed at stabilizing the core functionality and expanding the widget library. Despite its relative newness, the capabilities of the framework were clearly visible, which attracted the attention of the public.

In December 2018, Google announced the release of Flutter 1.0. The framework has become very advanced and has moved to an open source model.

Button widgets in Flutter provide interactive interaction with the user. Flutter offers several types of buttons, each of which is used in specific situations. For example, when creating a button with a raised (shadow) background color; when creating a button with plain text, without a background; when creating a button with a border but without a background; when

creating a button that only works with an icon; when creating a round button, usually with a + sign; when creating a menu button (with a list of options).

The standard features of a button in Flutter are given below:

1. We can easily apply themes on buttons, shapes, color, animation, and behavior.
2. We can also theme icons and text inside the button.
3. Buttons can be composed of different child widgets for different characteristics.

Following are the different types of button available in Flutter: Flat Button; Raised Button; Floating Button; Drop Down Button; Icon Button; Inkwell Button; PopupMenu Button; Outline Button.

The Button widget has the following common properties: onPressed: Function to be executed when the button is pressed; child: Widget inside the button (text, icon, etc.); style: Design properties (color, size, shape); icon: Icon (only IconButton, ElevatedButton.icon, etc.); tooltip: Text to help the user.

Let us discuss each button in detail.

1. Elevated Button

In Flutter, ElevatedButton is a raised, shadowed button that is used to attract the user's attention. It is a classic material design button and replaces the previous RaisedButton.

Example:

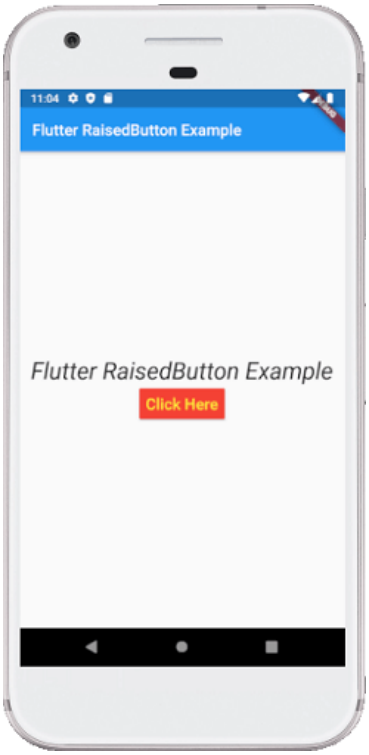
Open the main.dart file and replace it with the below code.

```
import 'package:flutter/material.dart';
void main() {
 runApp(MyApp());
}
class MyApp extends StatelessWidget {
 @override
 Widget build(BuildContext context) {
  return MaterialApp(
```

```
home: Scaffold(
 appBar: AppBar(title: Text('ElevatedButton Misoli')),
 body: Center(
  child: ElevatedButton(
   onPressed: () {
    print("Tugma bosildi");
   },
   child: Text('Bosish'),
   style: ElevatedButton.styleFrom(
    primary: Colors.purple,
    onPrimary: Colors.white,
    padding: EdgeInsets.symmetric(horizontal: 30, vertical: 15),
    textStyle: TextStyle(fontSize: 20),
    shape: RoundedRectangleBorder(
     borderRadius: BorderRadius.circular(10),
    ),
    elevation: 5,
   ),      ),      ),     ),    ); }   }
```

Output:

If we run this app, we will see the following screen:



2. Text Button

In Flutter, TextButton is the simplest and most modern text button, replacing FlatButton. TextButton has the following main properties: onPressed: Function that runs when the button is pressed; child: The widget on the button (usually Text); style: The style of the button (via TextButton.styleFrom()); onLongPress: Function that runs when the button is long-pressed; focusNode: For focus control; autofocus: The button will be automatically focused on initial load.

Example:

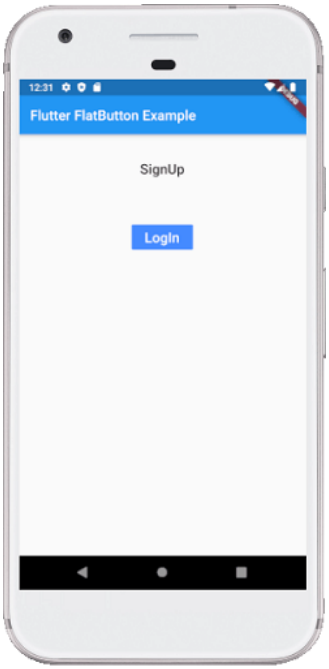
Open the main.dart file and replace it with the below code.

```
import 'package:flutter/material.dart';
void main() {
  runApp(MaterialApp(home: MyTextButtonApp()));
}
class MyTextButtonApp extends StatelessWidget {
```

```
@override
Widget build(BuildContext context) {
 return Scaffold(
  appBar: AppBar(title: Text('TextButton Misoli')),
  body: Center(
   child: TextButton(
    onPressed: () {
     print('Tugma bosildi');
    },
    style: TextButton.styleFrom(
     backgroundColor: Colors.green,
     foregroundColor: Colors.white,
     padding: EdgeInsets.symmetric(horizontal: 24, vertical: 12),
     textStyle: TextStyle(fontSize: 18),
    ),
    child: Text('Bosish'),
   ),
  ),
 );
 }
}
```

Output:

When we run this example, it will give the below screenshot. If we click on the "Click Here" button, it will change the text message. Show the second screenshot.



3. Floating Action Button

In Flutter, a FloatingActionButton (FAB) is a round button based on material design principles, located on one edge of the screen (usually the bottom right), and designed to perform a basic action (e.g., adding a new post, opening a chat).

Example:

Open the main.dart file and replace it with the below code.

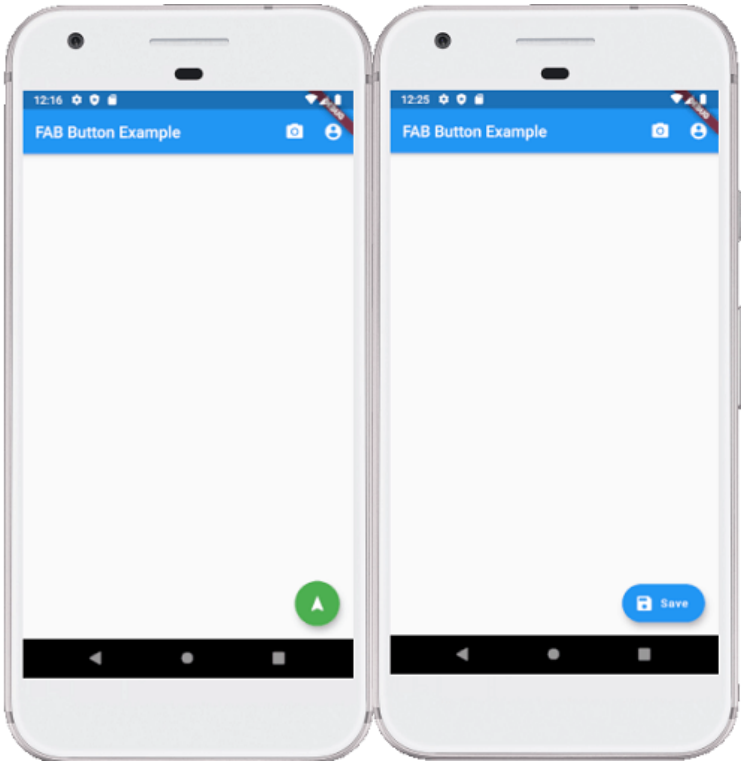
```
Scaffold(
 appBar: AppBar(title: Text('FAB misoli')),
 body: Center(child: Text('Bosh sahifa')),
 floatingActionButton: FloatingActionButton(
  onPressed: () {
   print('FAB bosildi');
  },
  child: Icon(Icons.add),
  tooltip: 'Yangi element qo‘shish',
```

```
    backgroundColor: Colors.teal,
  ),
)

FloatingActionButton.extended(
  onPressed: () {
    print('Yozuvli FAB bosildi');
  },
  icon: Icon(Icons.edit),
  label: Text('Tahrirlash'),
  backgroundColor: Colors.deepPurple,
)
```

Output:

Run the application in android emulator, and it will give the UI similar to the following screenshot.



4. Drop Down Button

In Flutter, DropdownButton is a widget that allows the user to select from a list of items, and is widely used in forms, settings pages, or interactive menus. DropdownButton has the following properties: value: The current selected value; onChanged: Functions to be executed when the value changes; items: A list of items to select; hint: A note to display if nothing is selected; isExpanded: Show the button in full width (true/false); icon: The icon that opens the list (Icon(Icons.arrow_drop_down)); dropdownColor: The background color of the list; style: The style of the text (TextStyle).

Example

Open the main.dart file and replace it with the below code.

```
import 'package:flutter/material.dart';
void main() {
  runApp(MaterialApp(home: MyDropdownApp()));
}
```

```
class MyDropdownApp extends StatefulWidget {
  @override
  _MyDropdownAppState createState() => _MyDropdownAppState();
}
class _MyDropdownAppState extends State<MyDropdownApp> {
  String tanlanganMeva = 'Olma'; // Boshlang‘ich qiymat
  final List<String> mevalar = ['Olma', 'Banan', 'Anor', 'Shaftoli'];
  @override
  Widget build(BuildContext context) {
    return Scaffold(
      appBar: AppBar(title: Text('DropdownButton Misoli')),
      body: Center(
        child: DropdownButton<String>(
          value: tanlanganMeva,
          icon: Icon(Icons.arrow_drop_down),
          style: TextStyle(color: Colors.black, fontSize: 18),
          dropdownColor: Colors.lightBlue[50],
          onChanged: (String? yangiQiymat) {
            setState(() {
              tanlanganMeva = yangiQiymat!;
            });
          },
          items: mevalar.map<DropdownMenuItem<String>>((String qiymat) {
            return DropdownMenuItem<String>(
              value: qiymat,
              child: Text(qiymat),
            );
```

```
        }).toList(),
      ),
    ),
  );
 }
}
```

Output

Run the application in android emulator, and it will give the UI similar to the following screenshot. The second image is an output of the list contains in the drop drown button.

Conclusion

In conclusion, the reforms in the educational process, the work being carried out in our republic, have reached several high levels. We can see that the creation of electronic educational resources in the educational process and the role of mobile applications in this is also increasing, and for this, the sequence of using Flutter in creating mobile applications, and using Flutter widgets in creating mobile applications is of great importance. The use of mobile applications in the educational process serves to increase the quality and efficiency of education.

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