

รายงานการเชื่อมต่อฐานข้อมูล

(Database Connection)

SSID Application (Suturing Skills Identification Device)

66120361	นางสาวตรีฤทัย แคนิหวาน
66126467	นางสาว พัชรา ขวัญปาน
66112772	นายอภินันท์ อายุยงค์
รายวิชา	Mobile Application Development
วันที่ส่ง	1 กุมภาพันธ์ 2569

สารบัญ

รายการหัวข้อหลัก (สำรอง):

- SQLite Database (2.5 คะแนน)
- Firebase Firestore (2.5 คะแนน)
- สรุป

1. SQLite Database (2.5 คะแนน)

1.1 โครงสร้างฐานข้อมูล

ฐานข้อมูล SQLite ชื่อ `ssid_app.db` ประกอบด้วย 4 ตาราง:

ตาราง	คำอธิบาย
users	ข้อมูลผู้ใช้งาน
sessions	ผลการวิเคราะห์กิจกรรม
notifications	การแจ้งเตือน
assignments	งานที่มอบหมาย

1.2 Code การเชื่อมต่อ SQLite

ไฟล์: lib/services/database_helper.dart

```
import 'package:sqflite/sqflite.dart';
import 'package:path/path.dart';

class DatabaseHelper {
    static final DatabaseHelper instance = DatabaseHelper._init();
    static Database? _database;

    DatabaseHelper._init();

    Future<Database> get database async {
        if (_database != null) return _database!;
        _database = await _initDB('ssid_app.db');
        return _database!;
    }

    Future<Database> _initDB(String filePath) async {
        final dbPath = await getDatabasesPath();
        final path = join(dbPath, filePath);

        return await openDatabase(
            path,
            version: 1,
            onCreate: _createDB,
        );
    }
}
```

1.3 CRUD Operations - SQLite

CREATE (เพิ่มข้อมูล)

```
// CREATE - Insert new user
Future<int> createUser(Map<String, dynamic> user) async {
    final db = await database;
    return await db.insert('users', user);
}

// CREATE - Insert new session
Future<int> createSession(Map<String, dynamic> session) async {
    final db = await database;
    return await db.insert('sessions', session);
}
```

CREATE:

រូបថែរី 1: នៅក្នុង Database Inspector ផ្តល់ព័ត៌មានអម្ចាល់ទាំងពីរនៃការបង្កើតការងារ users

The screenshot shows the Android Studio Database Inspector interface. The left sidebar lists databases: ssid_app.db (SQLiteDatabase) containing assignments, notifications, sessions, and users. The 'users' tab is selected, showing a table with columns: id, email, name, role, and created_at. There are two rows of data:

	1	xcv@mail.com	xcv	Student	2026-02-01 13:38:30
	2	asd@gmail.com	asd	Student	2026-02-01 15:48:06

READ (អោនខ្មែល)

```
// READ - Get user by email
Future<Map<String, dynamic>>?> getUserByEmail(String email) async {
  final db = await database;
  final result = await db.query(
    'users',
    where: 'email = ?',
    whereArgs: [email],
  );
  return result.isNotEmpty ? result.first : null;
}

// READ - Get all sessions
Future<List<Map<String, dynamic>>> getAllSessions() async {
  final db = await database;
  return await db.query('sessions', orderBy: 'analyzed_at DESC');
```

READ:

រូបថែរី 2: Database Inspector ផ្តល់ព័ត៌មានអម្ចាល់ទាំងពីរនៃការងារ sessions

The screenshot shows the Android Studio Database Inspector interface. The left sidebar lists databases: ssid_app.db (SQLiteDatabase) containing assignments, notifications, sessions, and users. The 'sessions' tab is selected, showing a table with columns: id, user_id, video_path, overall_score, suturing_score, hand_movement, tool_handling, time_efficiency, feedback, and analyzed_at. There are two rows of data:

	1	1	/data/user/0/com.91.26525442653	72.34468389089	85.18239558197	72.34885900466	81.94878232325	Excellent perform	2026-02-01T20:50:00Z		
	2	2	/data/user/0/com.70.08874235436	72.14781594276	70.50719209190	92.90074275284	84.8451363280E	Good effort! You	2026-02-01T22:50:00Z		

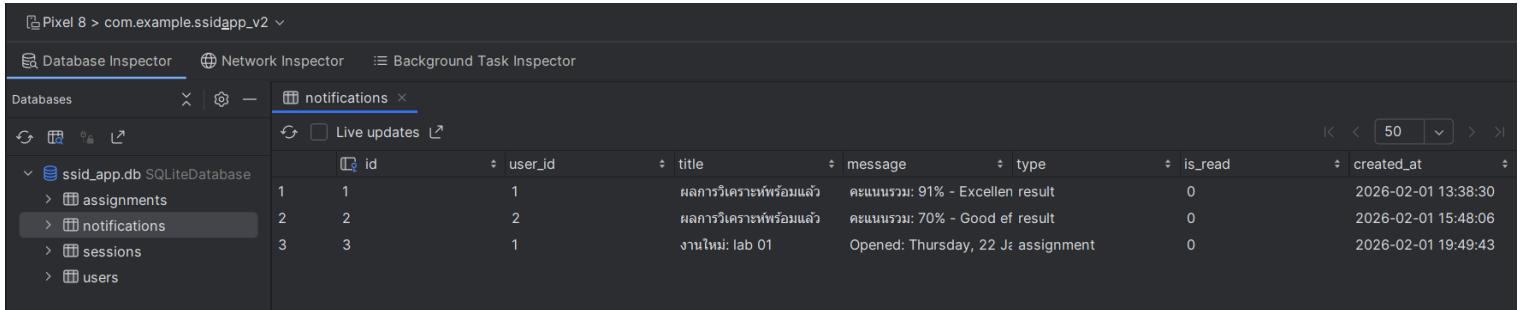
UPDATE (แก้ไขข้อมูล)

```
// UPDATE - Update user
Future<int> updateUser(int id, Map<String, dynamic> user) async {
  final db = await database;
  return await db.update(
    'users',
    user,
    where: 'id = ?',
    whereArgs: [id],
  );
}

// UPDATE - Mark notification as read
Future<int> markNotificationAsRead(int id) async {
  final db = await database;
  return await db.update(
    'notifications',
    {'is_read': 1},
    where: 'id = ?',
    whereArgs: [id],
  );
}
```

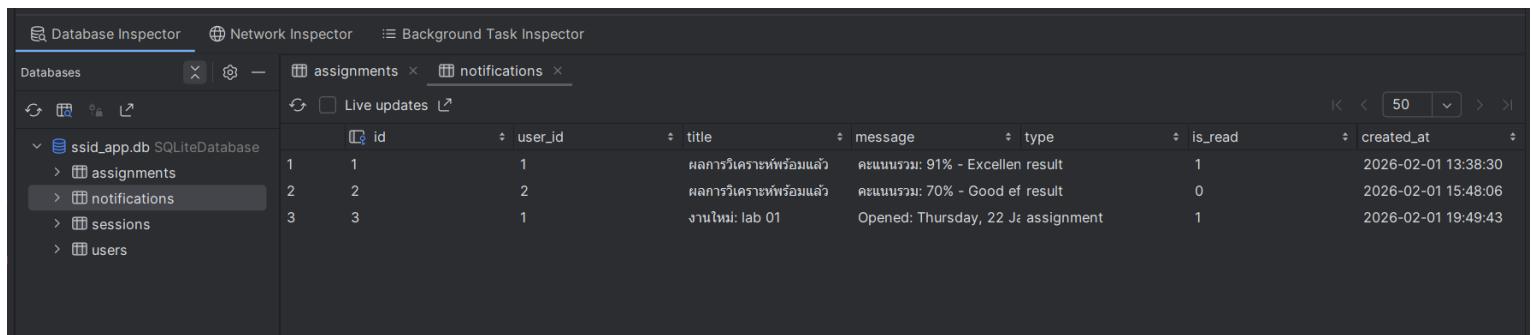
UPDATE:

รูปที่ 3: Database Inspector แสดงข้อมูลที่ถูกแก้ไข (is_read เปลี่ยนจาก 0 เป็น 1)



	id	user_id	title	message	type	is_read	created_at
1	1	1	ผลการวิเคราะห์ท่อรวมแล้ว	คะแนนรวม: 91% - Excellent result		0	2026-02-01 13:38:30
2	2	2	ผลการวิเคราะห์ท่อรวมแล้ว	คะแนนรวม: 70% - Good result		0	2026-02-01 15:48:06
3	3	1	งานใหม่: lab 01	Opened: Thursday, 22 Feb 2026 at 19:49:43		0	2026-02-01 19:49:43

รูปที่ 4: Database Inspector แสดงข้อมูลที่ถูกแก้ไข (is_read เปลี่ยนจาก 0 เป็น 1)



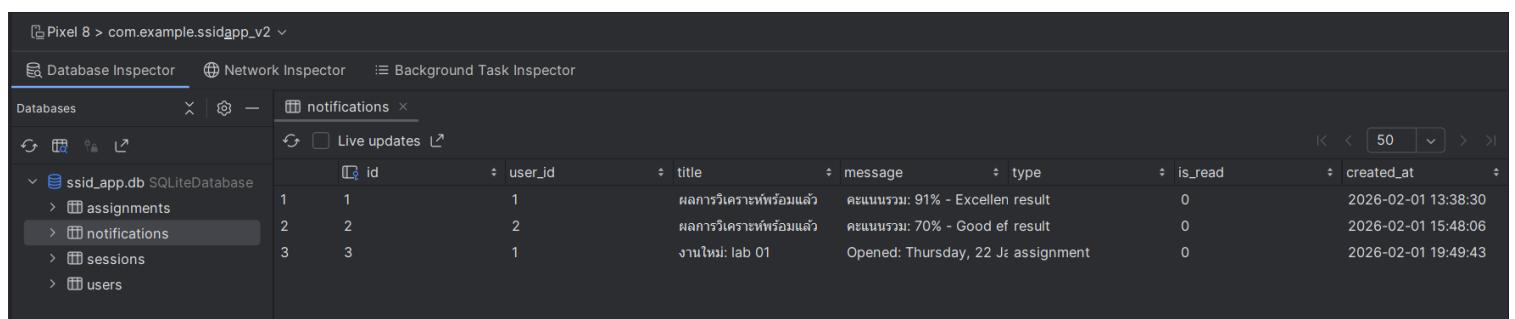
	id	user_id	title	message	type	is_read	created_at
1	1	1	ผลการวิเคราะห์ท่อรวมแล้ว	คะแนนรวม: 91% - Excellent result		1	2026-02-01 13:38:30
2	2	2	ผลการวิเคราะห์ท่อรวมแล้ว	คะแนนรวม: 70% - Good result		0	2026-02-01 15:48:06
3	3	1	งานใหม่: lab 01	Opened: Thursday, 22 Feb 2026 at 19:49:43		1	2026-02-01 19:49:43

DELETE (ลบข้อมูล)

```
// DELETE - Delete session
Future<int> deleteSession(int id) async {
    final db = await database;
    return await db.delete(
        'sessions',
        where: 'id = ?',
        whereArgs: [id],
    );
}

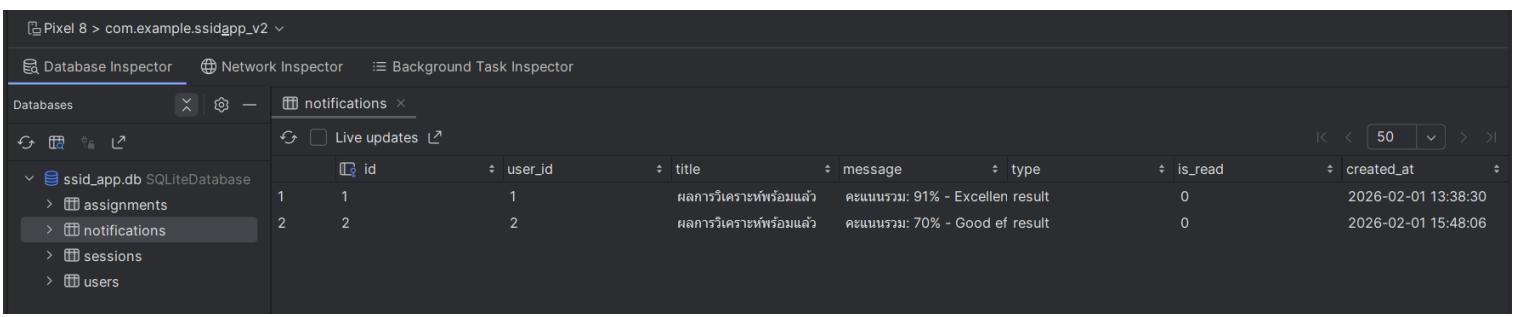
// DELETE - Delete notification
Future<int> deleteNotification(int id) async {
    final db = await database;
    return await db.delete(
        'notifications',
        where: 'id = ?',
        whereArgs: [id],
    );
}
```

DELETE:



notifications								
		id	user_id	title	message	type	is_read	created_at
		1	1	ผลการวิเคราะห์ที่ร้อนแม็ก	คะแนนรวม: 91% - Excellent result	0	2026-02-01 13:38:30	
		2	2	ผลการวิเคราะห์ที่ร้อนแม็ก	คะแนนรวม: 70% - Good ef result	0	2026-02-01 15:48:06	
		3	1	งานใหม่: lab 01	Opened: Thursday, 22 Feb assignment	0	2026-02-01 19:49:43	

รูปที่ 5: Database Inspector ก่อนและหลังลบข้อมูล

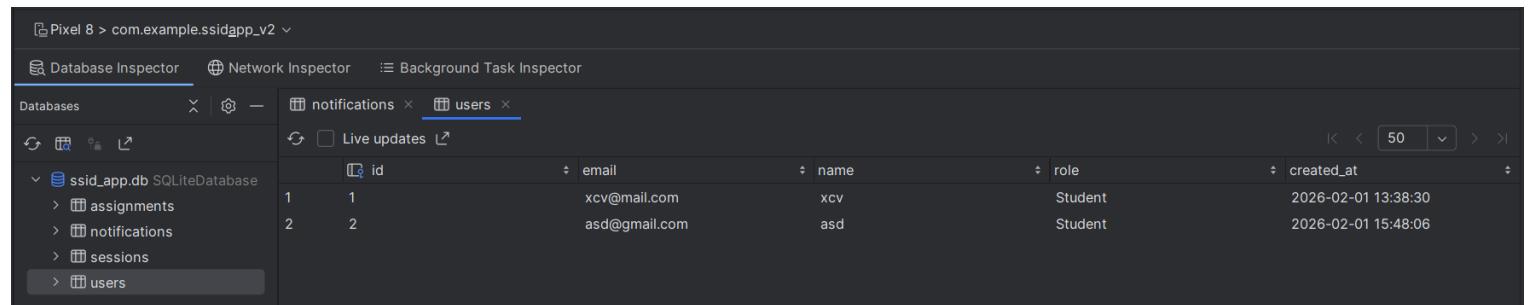


notifications								
		id	user_id	title	message	type	is_read	created_at
		1	1	ผลการวิเคราะห์ที่ร้อนแม็ก	คะแนนรวม: 91% - Excellent result	0	2026-02-01 13:38:30	
		2	2	ผลการวิเคราะห์ที่ร้อนแม็ก	คะแนนรวม: 70% - Good ef result	0	2026-02-01 15:48:06	

รูปที่ 6: Database Inspector ก่อนและหลังลบข้อมูล

1.4 กາພໜ້າຈອ SQLlite Database

ຕາരາງ users

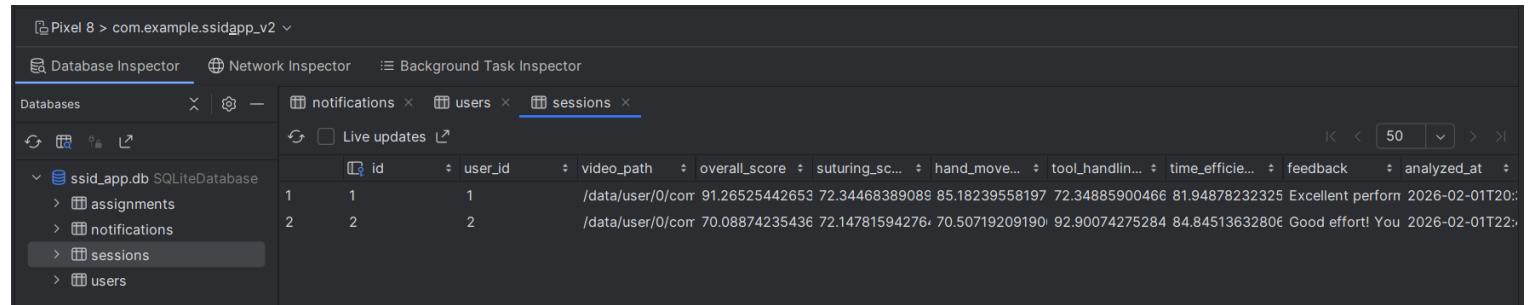


The screenshot shows the Database Inspector in Android Studio. The left sidebar lists databases: assignments, notifications, sessions, and users. The notifications database is selected. The main area shows the users table with the following data:

	id	email	name	role	created_at
1	1	xcv@mail.com	xcv	Student	2026-02-01 13:38:30
2	2	asd@gmail.com	asd	Student	2026-02-01 15:48:06

ຮູບທີ 7: Database Inspector ແສດງຕາຈາງ users

ຕາරາງ sessions

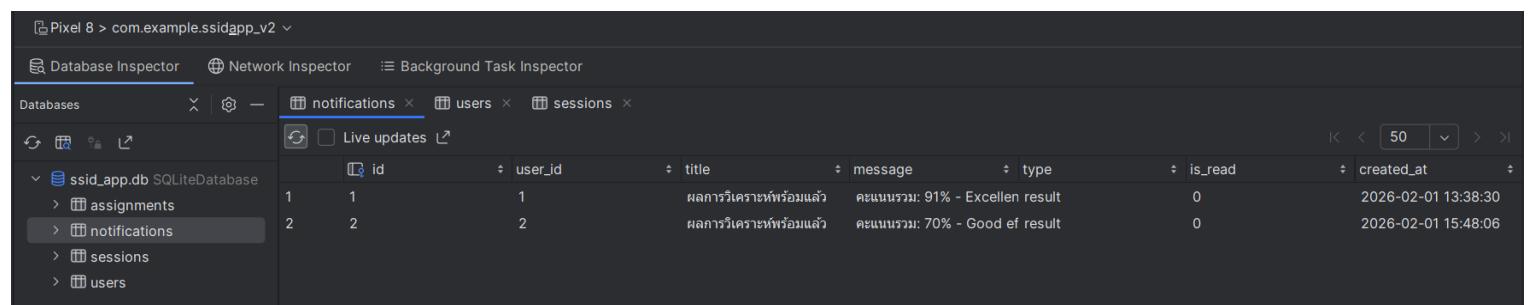


The screenshot shows the Database Inspector in Android Studio. The left sidebar lists databases: assignments, notifications, sessions, and users. The notifications database is selected. The main area shows the sessions table with the following data:

	id	user_id	video_path	overall_score	suturing_sc...	hand_move...	tool_handlin...	time_efficie...	feedback	analyzed_at
1	1	1	/data/user/0/corr	91.26525442653	72.34468389089	85.18239558197	72.34885900466	81.94878232325	Excellent perform	2026-02-01T20:00:00Z
2	2	2	/data/user/0/corr	70.08874235436	72.14781594276	70.50719209190	92.90074275284	84.84513632806	Good effort! You	2026-02-01T22:00:00Z

ຮູບທີ 8: Database Inspector ແສດງຕາຈາງ sessions

ຕາරາງ notifications

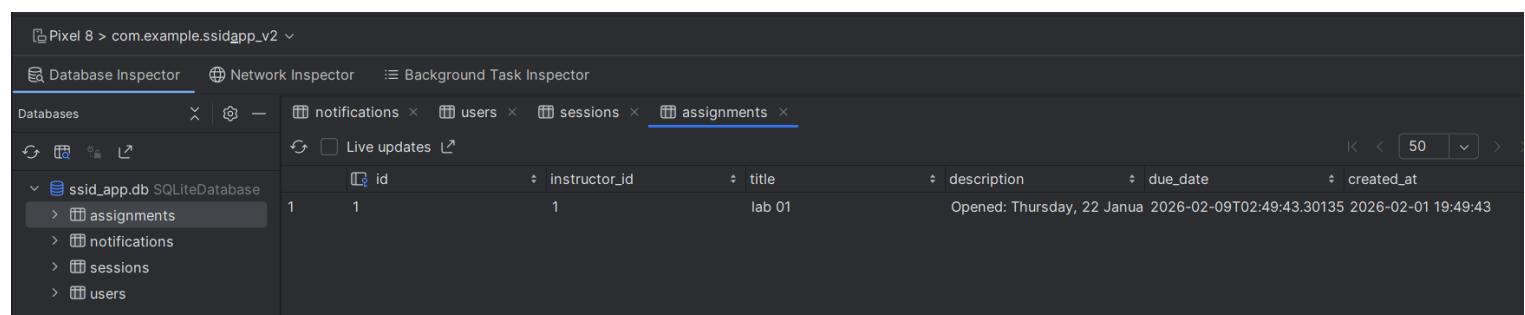


The screenshot shows the Database Inspector in Android Studio. The left sidebar lists databases: assignments, notifications, sessions, and users. The notifications database is selected. The main area shows the notifications table with the following data:

	id	user_id	title	message	type	is_read	created_at
1	1	1	ຜົກກະວິເຄາະທີ່ອ່ມແລ້ວ	ຄະແນນຮວມ: 91% - Excellent result	0	0	2026-02-01 13:38:30
2	2	2	ຜົກກະວິເຄາະທີ່ອ່ມແລ້ວ	ຄະແນນຮວມ: 70% - Good ef result	0	0	2026-02-01 15:48:06

ຮູບທີ 9: Database Inspector ແສດງຕາຈາງ notifications

ตาราง assignments



The screenshot shows the Android Studio Database Inspector with the SQLite database 'ssid_app.db' selected. The 'assignments' table is currently open, displaying one row of data:

	id	instructor_id	title	description	due_date	created_at
1	1	1	lab 01	Opened: Thursday, 22 Janua	2026-02-09T02:49:43.30135	2026-02-01 19:49:43

รูปที่ 10: Database Inspector แสดงตาราง assignments

2. Firebase Firestore (2.5 คะแนน)

2.1 การตั้งค่า Firebase

ไฟล์ Configuration: android/app/google-services.json

Dependencies ใน pubspec.yaml:

```
dependencies:  
  firebase_core: ^3.15.2  
  cloud_firestore: ^5.6.12  
  firebase_auth: ^5.7.0
```

2.2 Code การเชื่อมต่อ Firestore

ไฟล์ lib/services/firestore_service.dart

```
import 'package:cloud_firestore/cloud_firestore.dart';

class FirestoreService {
  final FirebaseFirestore _firebase = FirebaseFirestore.instance;

  // Reference to collections
  CollectionReference get usersCollection => _firebase.collection('users');
  CollectionReference get sessionsCollection => _firebase.collection('sessions');
  CollectionReference get notificationsCollection =>
    _firebase.collection('notifications');
  CollectionReference get assignmentsCollection =>
    _firebase.collection('assignments');
}
```

2.3 CRUD Operations - Firebase Firestore

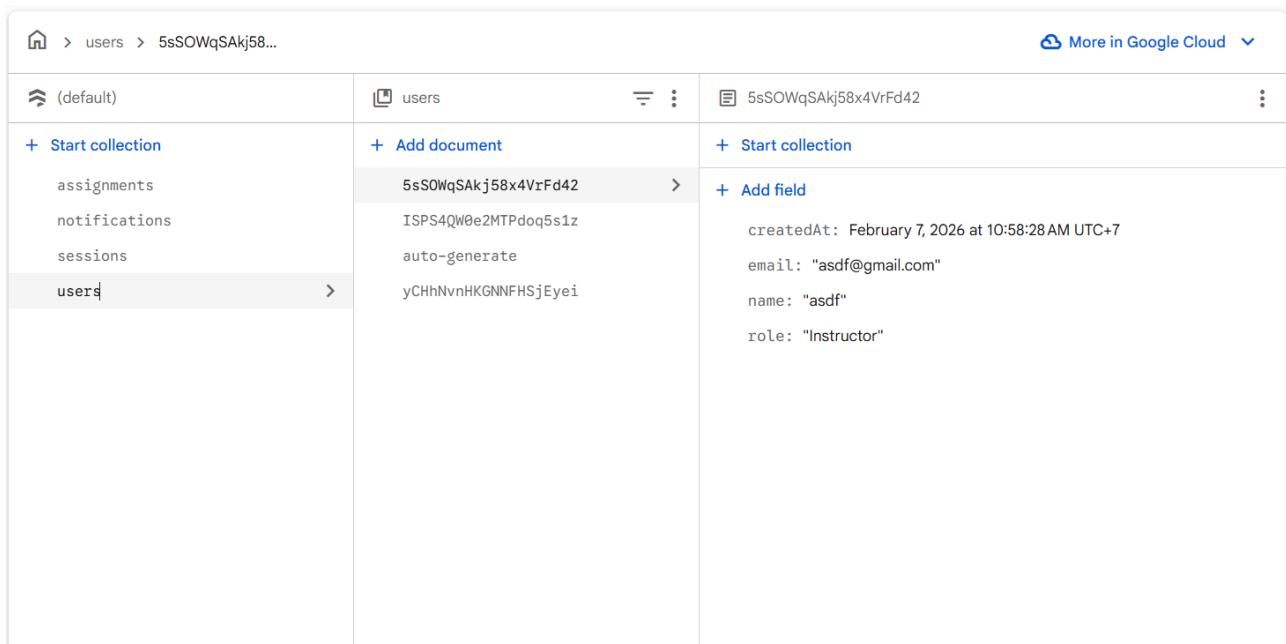
CREATE (ເພີ່ມຂໍ້ມູນ)

```
// CREATE - Add user to Firestore
Future<void> createUser(Map<String, dynamic> userData) async {
  await usersCollection.add({
    ...userData,
    'createdAt': FieldValue.serverTimestamp(),
  });
}

// CREATE - Add session to Firestore
Future<void> createSession(Map<String, dynamic> sessionData) async {
  await sessionsCollection.add({
    ...sessionData,
    'analyzedAt': FieldValue.serverTimestamp(),
  });
}
```

CREATE (Firebase Console):

ຮູບທີ 11: Firebase Console ແສດງ Document ທີ່ຖຸກເພີ່ມໃນ Collection users



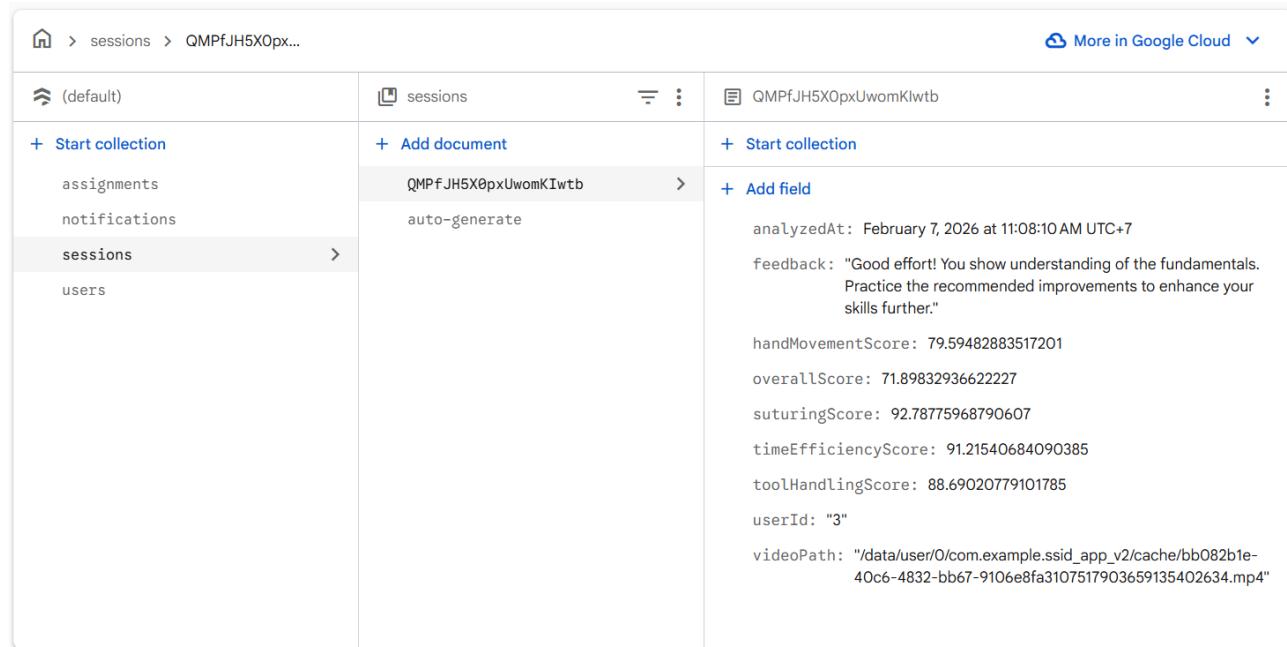
The screenshot shows the Firebase Realtime Database console. The path is set to 'users'. On the left, there's a sidebar with 'assignments', 'notifications', 'sessions', and 'users' selected. In the main area, there's a 'users' collection with one document listed: '5sSOWqSAkj58x4VrFd42'. This document has fields: 'createdAt' (February 7, 2026 at 10:58:28 AM UTC+7), 'email' (asdf@gmail.com), 'name' (asdf), and 'role' (Instructor).

READ (อ่านข้อมูล)

```
// READ - Get all users
Stream<QuerySnapshot> getUsers() {
    return usersCollection.snapshots();
}

// READ - Get sessions by user ID
Future<List<DocumentSnapshot>> getSessionsByUserId(String userId, QuerySortOrder orderBy, bool descending) {
    return usersCollection.doc(userId).get()
        .then((DocumentSnapshot snapshot) {
            return snapshot.docs;
        });
}
```

READ (Firebase Console):



The screenshot shows the Firebase console interface. The left sidebar shows a project structure with 'sessions' selected under 'assignments'. The main area displays a collection named 'sessions' with one document listed: 'QMPfJH5X0pxUwomKIwtb'. The document details are as follows:

analyzedAt: February 7, 2026 at 11:08:10 AM UTC+7
feedback: "Good effort! You show understanding of the fundamentals. Practice the recommended improvements to enhance your skills further."
handMovementScore: 79.59482883517201
overallScore: 71.89832936622227
suturingScore: 92.78775968790607
timeEfficiencyScore: 91.21540684090385
toolHandlingScore: 88.69020779101785
userId: "3"
videoPath: "/data/user/0/com.example.ssid_app_v2/cache/bb082b1e-40c6-4832-bb67-9106e8fa3107517903659135402634.mp4"

รูปที่ 12: Firebase Console แสดง Collection sessions พื้นที่ข้อมูล

UPDATE (แก้ไขข้อมูล)

```
// UPDATE - Update user profile
Future<void> updateUser(String docId, Map<String, dynamic> userData) async {
    await usersCollection.doc(docId).update(userData);
}

// UPDATE - Mark notification as read
Future<void> markNotificationAsRead(String docId) async {
    await notificationsCollection.doc(docId).update({
        'isRead': true,
    });
}
```

UPDATE (Firebase Console):

ภาพที่ 1 (ก่อน):

The screenshot shows the Firebase Database interface. On the left, there's a sidebar with 'Database' selected, showing collections: assignments, notifications (which is expanded), sessions, and users. In the main area, under the 'notifications' collection, a specific document is selected: 'Bd94PTjZBxhfsDWTj8XW'. This document has the following fields:

- createdAt: February 7, 2026 at 11:08:10 AM UTC+7
- isRead: false
- message: "คะแนนรวม: 72%"
- title: "ผลการเรียนรู้ที่พร้อมแล้ว"
- type: "result"
- userId: "1"

รูปที่ 13: Firebase Console แสดง Field ก่อนถูกแก้ไข

ภาพที่ 2 (หลัง):

The screenshot shows the same Firebase Database interface as before, but with a different document selected: '3a3R5F4qvHfnXI9H9W6p'. This document has the following fields:

- createdAt: February 7, 2026 at 12:34:50 PM UTC+7
- isRead: true
- message: "ดีไซน์ zx"
- title: "งานใหม่: zx"
- type: "assignment"
- userId: ""

รูปที่ 14: Firebase Console แสดง Field ที่ถูกแก้ไข

DELETE (ลบข้อมูล)

```
// DELETE - Delete session
Future<void> deleteSession(String docId) async {
  await sessionsCollection.doc(docId).delete();
}

// DELETE - Delete notification
Future<void> deleteNotification(String docId) async {
  await notificationsCollection.doc(docId).delete();
}
```

ภาพที่ 1 (ก่อน):

The screenshot shows the Firebase Database interface. On the left, there's a sidebar with 'Database' selected. Under 'Database', there are three collections: 'assignments', 'notifications' (which is expanded), and 'sessions'. The 'notifications' collection has three documents: 'Bd94PTjZBxhfsDWTj8XW', 'NwgxRtjmj14WB57WmLbE', and 'URy9nQD9e2U4mx0mRZhF'. The first document is selected and shown in detail on the right. It contains fields: 'createdAt' (February 7, 2026 at 11:08:10 AM UTC+7), 'isRead' (false), 'message' ("คะแนนรวม: 72%"), 'title' ("ผลการวิเคราะห์พร้อมแล้ว"), 'type' ("result"), and 'userId' ("1").

รูปที่ 15: Firebase Console แสดง Field ก่อนถูกแก้ไข

ภาพที่ 2 (หลัง):

The screenshot shows the same Firebase Database interface as before, but now the document 'Bd94PTjZBxhfsDWTj8XW' has been deleted. The 'notifications' collection still lists the other two documents ('NwgxRtjmj14WB57WmLbE' and 'URy9nQD9e2U4mx0mRZhF'). A message at the bottom of the right panel states: "This document does not exist, it will not appear in queries or snapshots." with a link to "Learn more".

รูปที่ 16: Firebase Console แสดง Field ที่ถูกแก้ไข

2.4 ภาพหน้าจอ Firebase Firestore

Collection users

The screenshot shows the Firebase Firestore interface. On the left, there's a sidebar with a '(default)' icon, followed by a list of collections: 'assignments', 'notifications', 'sessions', and 'users'. The 'users' collection is currently selected, indicated by a grey background. In the main area, there's a header with a 'users' icon and the text '+ Add document'. Below this, a document list shows one item: 'C8E9tw0mqfe1c2u0AGM4' with a timestamp 'FvhI927vMK3URP52j0uh' and status 'auto-generate'. To the right of the document list, there's a detailed view of the document 'C8E9tw0mqfe1c2u0AGM4'. It includes fields: 'createdAt' (February 7, 2026 at 7:00:50 PM UTC+7), 'email' ('beam@gmail.com'), 'name' ('beam'), and 'role' ('Student'). At the top right of the main area, there's a 'More in Google Cloud' dropdown.

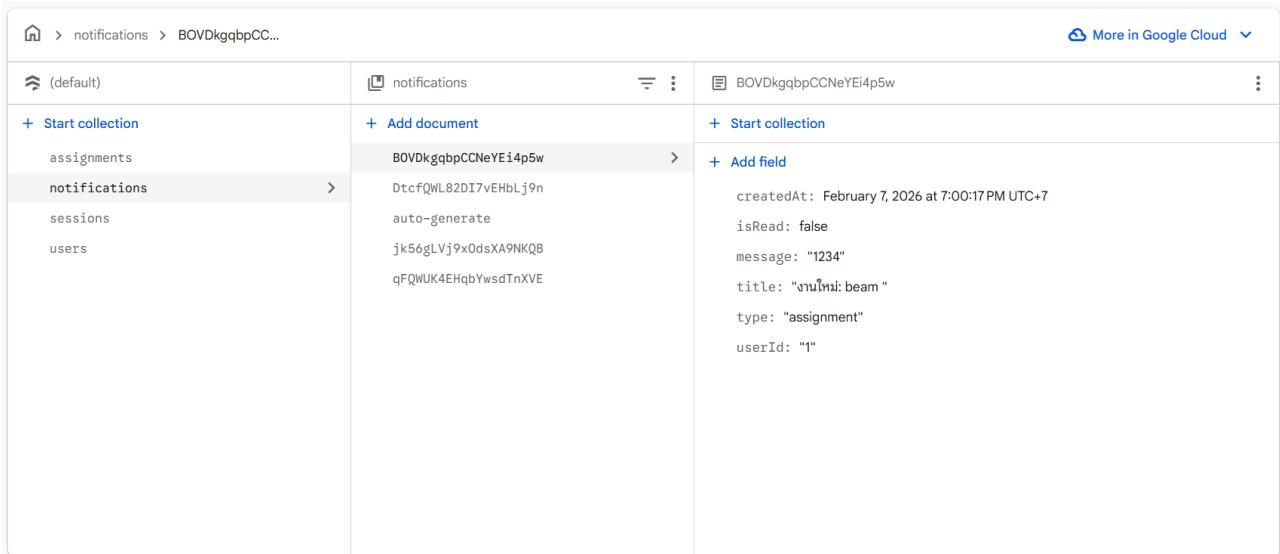
รูปที่ 17: Firebase Console แสดง Collection users

Collection sessions

The screenshot shows the Firebase Firestore interface. On the left, there's a sidebar with a '(default)' icon, followed by a list of collections: 'assignments', 'notifications', 'sessions', and 'users'. The 'sessions' collection is currently selected. In the main area, there's a header with a 'sessions' icon and the text '+ Add document'. Below this, a document list shows one item: 'k6ffhqmFQHbpAkBWrlc1' with a timestamp 'analyzedAt' (February 7, 2026 at 7:14:46 PM UTC+7). To the right of the document list, there's a detailed view of the document 'k6ffhqmFQHbpAkBWrlc1'. It includes fields: 'feedback' ("Very good work! Your technique is solid with minor areas for improvement. Focus on consistency and precision in your movements."), 'handMovementScore' (81.81536126754949), 'overallScore' (80.81310488415049), 'suturingScore' (85.48467678046735), 'timeEfficiencyScore' (92.6275334411965), 'toolHandlingScore' (75.59597032238881), 'userId' ('4'), and 'videoPath' ('/data/user/0/com.example ssid_app_v2/cache/42b33c34-7ff5-4a92-b276-9387f21ba76d/38.mp4'). At the top right of the main area, there's a 'More in Google Cloud' dropdown.

รูปที่ 18: Firebase Console แสดง Collection sessions

Collection notifications

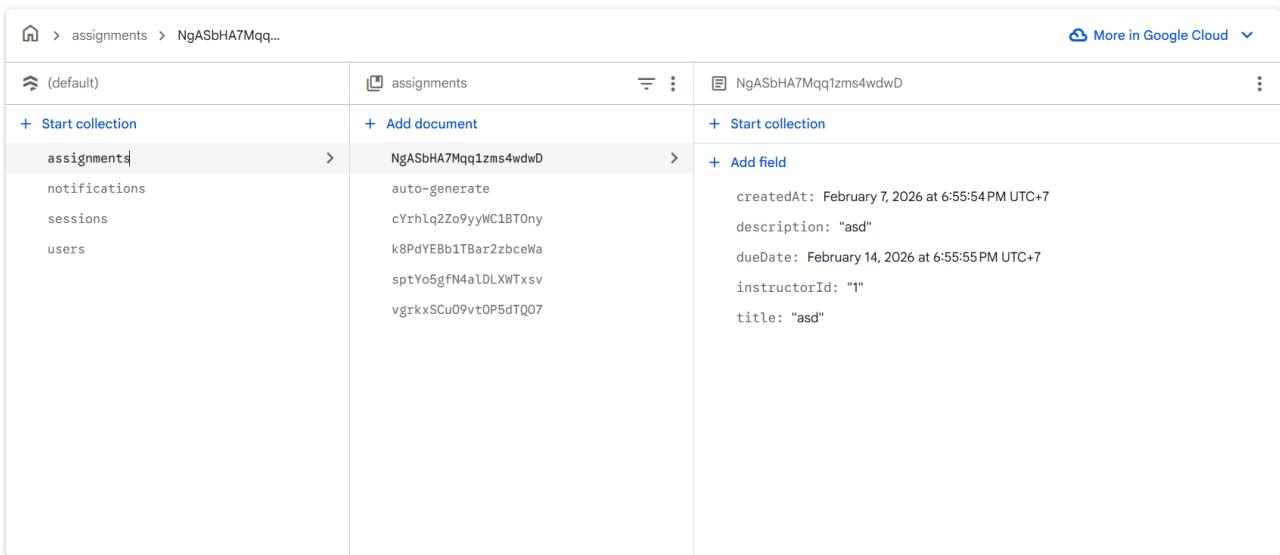


The screenshot shows the Firebase console interface for the 'notifications' collection. On the left, there's a sidebar with 'assignments', 'notifications' (which is selected), 'sessions', and 'users'. The main area shows a document named 'BOVDkgqbpCCNeYEi4p5w' with the following fields:

- auto-generate
- createdAt: February 7, 2026 at 7:00:17 PM UTC+7
- isRead: false
- message: "1234"
- title: "งานใหม่: beam"
- type: "assignment"
- userId: "1"

รูปที่ 19: Firebase Console แสดง Collection notifications

Collection assignments



The screenshot shows the Firebase console interface for the 'assignments' collection. On the left, there's a sidebar with 'assignments' (which is selected), 'notifications', 'sessions', and 'users'. The main area shows a document named 'NgASbHA7Mqq1zms4wdwD' with the following fields:

- auto-generate
- createdAt: February 7, 2026 at 6:55:54 PM UTC+7
- description: "asd"
- dueDate: February 14, 2026 at 6:55:55 PM UTC+7
- instructorId: "1"
- title: "asd"

รูปที่ 20: Firebase Console แสดง Collection assignments

3. สรุป

รายการที่ดำเนินการ

หัวข้อ	รายละเอียด	คะแนน
SQLite Database	เขียนต่อและทำ CRUD ได้ครบ 4 operations	2.5
Firebase Firestore	เขียนต่อและทำ CRUD ได้ครบ 4 operations	2.5
รวม		5.0

Hybrid Database Architecture

แอปพลิเคชันใช้ Hybrid Database:

- SQLite: เก็บข้อมูลท้องถิ่นสำหรับใช้งาน Offline
- Firebase Firestore: Sync ข้อมูลขึ้น Cloud สำหรับ Backup และ Real-time updates

