

Final Optimized Collection Structure (Only 4 Collections)

Collection Name	Purpose
User	Stores all users (Admin, Teachers, Students)
Classes	Stores class details and assigned students/teachers
StudentProgress	Tracks student progress and topic completion
Questions	Stores all topic-based questions

User Collection (Stores All Users: Admin, Teachers, Students)

Purpose: Stores authentication details and user roles (Admin, Teacher, Student).

```
{
  "_id": "<Auto-generated MongoDB ID>",
  "name": "<Full Name>",
  "email": "<User Email>",
  "password": "<Hashed Password>",
  "type": "<student | teacher | admin>",
  "grade": "<Grade Level (only for students)>",
  "gender": "<Male | Female | Other (only for students)>",
  "school_name": "<School Name (only for students)>",
  "assigned_classes": ["<Class ID 1>", "<Class ID 2>"] (only for teachers),
  "creation_timestamp": "<Timestamp>"
}
```

Classes Collection

Purpose: Stores class details, student enrollments, and teacher assignments.

```
{
  "_id": "",
  "class_id": "",
  "class_name": "",
```

```

    "grade_level": "",
    "academic_year": "",
    "subject": "",
    "teacher_id": "",
    "students": ["", ""],
    "status": "",
    "created_at": "",
    "updated_at": "",
    "schedule": {
        "day": "",
        "start_time": "",
        "end_time": ""
    },
    "max_capacity": "",
    "description": ""
}

```

StudentProgress Collection

Purpose: Tracks student progress, including assigned topics, difficulty levels, and performance.

```

{
  "_id": "",
  "student_id": "",
  "class_id": "",
  "topic": "",
  "sub_topic": "",
  "difficulty": "",

  // Enhanced tracking fields
  "session_data": [
    {
      "session_id": "",
      "start_time": "",
      "end_time": "",
      "questions_attempted": [
        {
          "question_id": "",

```

```

        "difficulty": "",
        "response_time": "",
        "is_correct": "",
        "attempt_timestamp": ""
    },
    ],
    "duration": ""
},
],
// Aggregated metrics
"performance_metrics": {
    "total_questions_displayed": "",
    "total_questions_correct": "",
    "accuracy_percentage": "",
    "average_response_time": "",
    "difficulty_distribution": {
        "easy": {
            "attempted": "",
            "correct": ""
        },
        "medium": {
            "attempted": "",
            "correct": ""
        },
        "hard": {
            "attempted": "",
            "correct": ""
        }
    },
    "total_time_spent": "",
    "last_activity": ""
},
// Progress tracking
"completion_status": "",
"completion_timestamp": "",
"mastery_level": ""
}

```

Questions Collection

Purpose: Stores questions, including multiple-choice answers, solutions, and difficulty levels.

```
{
  "_id": "<Auto-generated MongoDB ID>",
  "description": "Find the vector equation...",
  "type": "SCQ",
  "options": [
    {"option_id": 1, "text": "<Option 1>", "is_correct": false},
    {"option_id": 2, "text": "<Option 2>", "is_correct": true},
    {"option_id": 3, "text": "<Option 3>", "is_correct": false},
    {"option_id": 4, "text": "<Option 4>", "is_correct": false}
  ],
  "solution": "Vector equation of the line...",
  "difficulty": "UNMARKED",
  "topic": null,
  "sub_topic": "Section2",
  "tags": [],
  "topic_id": "test-data"
}
```

Assignments Collection Schema

Purpose: This collection would:

1. Track both student-wise and class-wise assignments
2. Link to both the StudentProgress and User collections
3. Allow tracking of individual student completions within class assignments
4. Support the teacher dashboard requirements for assignment management

```
{
  "_id": "<Auto-generated MongoDB ID>",
  "teacher_id": "<Teacher User ID>",
  "assignment_type": "<student | class>",
  // If student-wise assignment
  "student_id": "<Student User ID>",
  // If class-wise assignment
  "class_id": "<Class ID>",
  "subject": "<Subject Name>",
  "topic": "<Topic Name>",
  "sub_topic": "<Sub-topic Name>",
  "status": "<pending | completed>",
  "assigned_date": "<Timestamp>",
  "completion_date": "<Timestamp>",
  // For tracking which students have completed in class-wise
  assignments
}
```

```
    "student_completions": [  
      {  
        "student_id": "<Student User ID>",  
        "completion_date": "<Timestamp>",  
        "progress_id": "<Reference to StudentProgress  
Collection>"  
      },  
    ],  
    // Optional fields for assignment management  
    "due_date": "<Timestamp>",  
    "instructions": "<Assignment Instructions>",  
    "difficulty_level": "<easy | medium | hard>",  
    "is_active": "<boolean>"  
  }  
}
```