Evaluation & Recording API Documentation

Overview

This document describes the APIs for **skill-based evaluation and recording** for the LRG (Listening, Reading, Grammar) system. Each session tracks performance at the **skill level** with time duration, mastery levels, and comprehensive user progress tracking across day 1 to day 90.

Table of Contents

Core Session APIs

1. Start Session

Endpoint: `POST /api/v1/sessions`

Description: Creates a new test session for a user on a specific day and modality.

Request Body:

```
{
  "user_id": "uuid",
  "modality": "listening",  // listening | reading | grammar
  "day_code": "day1",       // day1 to day90
  "started_at": "2025-10-06T10:00:00Z"
}
```

Response: `201 Created`

```
{
  "session_id": "uuid",
  "user_id": "uuid",
  "modality": "listening",
  "day_code": "day1",
  "started_at": "2025-10-06T10:00:00Z",
  "message": "Session started successfully"
}
```

2. Submit Session with Skill Data

Endpoint: `POST /api/v1/sessions/{session_id}/submit`

Description: Submits completed session with all answers. **Each answer must include a skill** for evaluation tracking. Automatically calculates and records:

- Overall session score
- Skill-level mastery breakdown
- User's cumulative skill mastery
- XP, streaks, and badges

Request Body:

```json
{
  "answers": [
    {
      "item_id": "q1",
      "user_answer": "Paris",
      "correct_answer": "Paris",
      "is_correct": true,
      "time_spent_sec": 45,
      "topic": "geography",
      "skill": "vocabulary"  // REQUIRED: Specific skill being evaluated
    },
    {
      "item_id": "q2",
      "user_answer": "comprehension answer",
      "correct_answer": "comprehension answer",
      "is_correct": true,
      "time_spent_sec": 60,
      "topic": "passage_1",
      "skill": "main_idea"
    }
  ],
  "completed_at": "2025-10-06T10:15:00Z",
  "duration_sec": 900,
  "score_pct": 85,
  "xp_earned": 100,
  "skill_scores": {  // OPTIONAL: Pre-calculated skill breakdown
    "vocabulary": {
      "correct": 5,
      "total": 6,
      "mastery_pct": 83
    },
    "main_idea": {
      "correct": 8,
      "total": 10,
      "mastery_pct": 80
```

```json
        }
      }
    }
```

Response: 200 OK

```json
{
  "session_id": "uuid",
  "analytics_recorded": true,
  "xp_awarded": 100,
  "badges_awarded": [
    {
      "badge_key": "first_perfect",
      "title": "Perfect Score",
      "earned_at": "2025-10-06T10:15:00Z"
    }
  ],
  "streak_updated": true,
  "current_streak": 5,
  "message": "Session submitted successfully"
}
```

3. Get Session Details

Endpoint: GET /api/v1/sessions/{session_id}

Description: Retrieves complete session information including all answers.

Response: 200 OK

```json
{
  "session_id": "uuid",
  "user_id": "uuid",
  "modality": "listening",
  "day_code": "day1",
  "started_at": "2025-10-06T10:00:00Z",
  "completed_at": "2025-10-06T10:15:00Z",
  "duration_sec": 900,
  "score_pct": 85,
  "xp_earned": 100,
  "answers": [
    {
      "answer_id": "uuid",
      "item_id": "q1",
      "user_answer": "Paris",
      "correct_answer": "Paris",
      "is_correct": true,
      "time_spent_sec": 45,
```

```
      "topic": "geography",
      "skill": "vocabulary"
    }
  ]
}
```

Skill Mastery & Evaluation APIs

4. Get Session Mastery Breakdown

Endpoint: `GET /api/v1/sessions/{session_id}/mastery`

Description: Returns skill-by-skill mastery breakdown for a completed session.

Response: `200 OK`

```
{
  "session_id": "uuid",
  "modality": "listening",
  "day_code": "day1",
  "overall_score_pct": 85,
  "duration_sec": 900,
  "skills": [
    {
      "skill": "vocabulary",
      "correct": 5,
      "total": 6,
      "mastery_pct": 83,
      "mastery_level": "proficient"
    },
    {
      "skill": "main_idea",
      "correct": 8,
      "total": 10,
      "mastery_pct": 80,
      "mastery_level": "proficient"
    },
    {
      "skill": "details",
      "correct": 3,
      "total": 5,
      "mastery_pct": 60,
      "mastery_level": "developing"
    }
  ],
  "mastery_levels": {
    "beginner": 0,
    "developing": 1,
    "proficient": 2,
    "advanced": 0
```

```
      }
  }
```

---

5. Get User Skill Progress

Endpoint: `GET /api/v1/users/{user_id}/skills/progress`

Description: Tracks user's skill development across sessions for a specific modality.

Query Parameters:

- `modality` (required): `listening`, `reading`, or `grammar`
- `from_day` (optional): Starting day code (e.g., `day1`)
- `to_day` (optional): Ending day code (e.g., `day10`)

Example: `GET /api/v1/users/{user_id}/skills/progress?modality=listening&from_day=day1&to_day=day10`

Response: `200 OK`

```json
{
  "modality": "listening",
  "date_range": "day1-day10",
  "skills": [
    {
      "skill": "vocabulary",
      "sessions_practiced": 10,
      "total_questions": 60,
      "correct_answers": 52,
      "overall_mastery_pct": 87,
      "mastery_level": "proficient",
      "trend": "improving"  // improving | stable | declining
    },
    {
      "skill": "main_idea",
      "sessions_practiced": 8,
      "total_questions": 40,
      "correct_answers": 32,
      "overall_mastery_pct": 80,
      "mastery_level": "proficient",
      "trend": "stable"
    },
    {
      "skill": "inference",
      "sessions_practiced": 5,
      "total_questions": 25,
      "correct_answers": 18,
      "overall_mastery_pct": 72,
      "mastery_level": "developing",
      "trend": "improving"
```

```
      }
    ]
  }
```

---

6. Get Mastery Overview Dashboard

Endpoint: `GET /api/v1/users/{user_id}/mastery-overview`

Description: Complete mastery snapshot across all three modalities.

Response: `200 OK`

```json
{
  "user_id": "uuid",
  "listening": {
    "overall_mastery_pct": 78,
    "skills": {
      "vocabulary": 85,
      "main_idea": 80,
      "details": 70,
      "inference": 82,
      "speaker_purpose": 68
    }
  },
  "reading": {
    "overall_mastery_pct": 82,
    "skills": {
      "vocabulary": 88,
      "main_idea": 85,
      "details": 75,
      "inference": 80,
      "author_purpose": 84
    }
  },
  "grammar": {
    "overall_mastery_pct": 75,
    "skills": {
      "verb_tenses": 80,
      "subject_verb_agreement": 78,
      "articles": 72,
      "prepositions": 70,
      "conditionals": 75
    }
  }
}
```

Data Models

AnswerSubmission

```
{
  "item_id": str,              # Question/task ID
  "user_answer": str | null,
  "correct_answer": str,
  "is_correct": bool,
  "time_spent_sec": int,       # Time in seconds
  "topic": str | null,         # General topic/category
  "skill": str                 # REQUIRED: Specific skill (e.g.,
"vocabulary")
}
```

SkillScore

```
{
  "skill": str,
  "correct": int,
  "total": int,
  "mastery_pct": int,          # 0-100
  "mastery_level": str         # beginner | developing | proficient |
advanced
}
```

Database Schema

Table: lrg_answers

Enhanced to include **skill** tracking:

```
CREATE TABLE lrg_answers (
  answer_id UUID PRIMARY KEY,
  session_id UUID REFERENCES lrg_sessions(session_id),
  item_id TEXT NOT NULL,
  user_answer TEXT,
  correct_answer TEXT NOT NULL,
  is_correct BOOLEAN NOT NULL,
  time_spent_sec INTEGER NOT NULL,
  topic TEXT,
  skill TEXT NOT NULL,  -- NEW: Skill being evaluated
  created_at TIMESTAMP WITH TIME ZONE DEFAULT NOW()
);
```

Table: lrg_session_skills

Stores skill breakdown per session:

```
CREATE TABLE lrg_session_skills (
  skill_record_id UUID PRIMARY KEY,
  session_id UUID REFERENCES lrg_sessions(session_id),
  skill TEXT NOT NULL,
  correct INTEGER NOT NULL,
  total INTEGER NOT NULL,
  mastery_pct INTEGER NOT NULL,  -- 0-100
  mastery_level TEXT NOT NULL,   -- beginner | developing | proficient |
advanced
  created_at TIMESTAMP WITH TIME ZONE DEFAULT NOW(),

  UNIQUE (session_id, skill)
);
```

Table: `lrg_skill_mastery`

Cumulative skill mastery per user/modality:

```
CREATE TABLE lrg_skill_mastery (
  mastery_id UUID PRIMARY KEY,
  user_id UUID NOT NULL,
  modality TEXT NOT NULL,  -- listening | reading | grammar
  skill TEXT NOT NULL,
  total_attempts INTEGER NOT NULL DEFAULT 0,
  correct_attempts INTEGER NOT NULL DEFAULT 0,
  mastery_pct INTEGER NOT NULL DEFAULT 0,
  last_updated TIMESTAMP WITH TIME ZONE DEFAULT NOW(),

  UNIQUE (user_id, modality, skill)
);
```

Skill Taxonomy

Listening Skills

- `vocabulary` - Word recognition and meaning
- `main_idea` - Understanding central message
- `details` - Specific information recall
- `inference` - Drawing conclusions
- `speaker_purpose` - Understanding intent
- `tone` - Recognizing attitude/emotion

Reading Skills

- `vocabulary` - Word meaning in context
- `main_idea` - Identifying theme
- `details` - Specific facts
- `inference` - Reading between lines
- `author_purpose` - Understanding intent
- `text_structure` - Organization patterns

Grammar Skills

- `verb_tenses` - Past, present, future forms
- `subject_verb_agreement` - Matching subjects and verbs
- `articles` - a, an, the usage
- `prepositions` - in, on, at, etc.
- `pronouns` - he, she, it, they, etc.
- `conditionals` - if/then structures
- `passive_voice` - Passive constructions
- `modals` - can, could, should, etc.

Mastery Level Calculation

Mastery levels are calculated based on percentage correct:

Mastery Level	Percentage Range	Description
Beginner	0% - 49%	Still learning the basics
Developing	50% - 74%	Making progress
Proficient	75% - 89%	Strong understanding
Advanced	90% - 100%	Mastered the skill

Usage Examples

Example 1: Submit Listening Session (Day 5)

Request:

```
POST /api/v1/sessions/{session_id}/submit

{
  "answers": [
    {
      "item_id": "day5_q1",
      "user_answer": "economy",
      "correct_answer": "economy",
      "is_correct": true,
      "time_spent_sec": 30,
      "topic": "lecture_1",
```

API_EVALUATION_DOCUMENTATION.md

2025-10-06

```json
        "skill": "vocabulary"
      },
      {
        "item_id": "day5_q2",
        "user_answer": "economic growth strategies",
        "correct_answer": "economic growth strategies",
        "is_correct": true,
        "time_spent_sec": 45,
        "topic": "lecture_1",
        "skill": "main_idea"
      },
      {
        "item_id": "day5_q3",
        "user_answer": "15%",
        "correct_answer": "20%",
        "is_correct": false,
        "time_spent_sec": 25,
        "topic": "lecture_1",
        "skill": "details"
      }
    ],
    "completed_at": "2025-10-06T11:30:00Z",
    "duration_sec": 600,
    "score_pct": 67,
    "xp_earned": 80
}
```

Example 2: Check Skill Progress After 10 Days

Request:

```
GET /api/v1/users/abc-123/skills/progress?
modality=reading&from_day=day1&to_day=day10
```

Response:

```json
{
  "modality": "reading",
  "date_range": "day1-day10",
  "skills": [
    {
      "skill": "vocabulary",
      "sessions_practiced": 10,
      "total_questions": 80,
      "correct_answers": 68,
      "overall_mastery_pct": 85,
      "mastery_level": "proficient",
      "trend": "improving"
```

10 / 13

```json
      },
      {
        "skill": "inference",
        "sessions_practiced": 10,
        "total_questions": 50,
        "correct_answers": 35,
        "overall_mastery_pct": 70,
        "mastery_level": "developing",
        "trend": "stable"
      }
    ]
  }
```

Example 3: View Session Mastery Breakdown

Request:

```
GET /api/v1/sessions/{session_id}/mastery
```

Response:

```json
{
  "session_id": "xyz-789",
  "modality": "grammar",
  "day_code": "day20",
  "overall_score_pct": 88,
  "duration_sec": 720,
  "skills": [
    {
      "skill": "verb_tenses",
      "correct": 9,
      "total": 10,
      "mastery_pct": 90,
      "mastery_level": "advanced"
    },
    {
      "skill": "articles",
      "correct": 7,
      "total": 8,
      "mastery_pct": 88,
      "mastery_level": "proficient"
    }
  ],
  "mastery_levels": {
    "beginner": 0,
    "developing": 0,
    "proficient": 1,
    "advanced": 1
```

```
    }
  }
}
```

Implementation Notes

1. **Time Tracking**: Each question requires `time_spent_sec` to analyze learning patterns
2. **Skill Assignment**: Every answer must have a `skill` field for evaluation
3. **Mastery Calculation**: Automatically calculated on session submit
4. **Cumulative Updates**: User skill mastery updates after each session
5. **Day Range**: System supports day1 to day90 tracking
6. **Real-time Analytics**: Mastery data available immediately after submission

---

Error Handling

Common Error Responses

400 Bad Request - Missing required skill field:

```
{
  "detail": "Field 'skill' is required for each answer"
}
```

404 Not Found - Session doesn't exist:

```
{
  "detail": "Session not found or no skill data available"
}
```

403 Forbidden - Unauthorized access:

```
{
  "detail": "Cannot view another user's skill progress"
}
```

Integration Checklist

- ☐ Database migration executed (migrations/001_skill_mastery_tables.sql)
- ☐ Frontend sends `skill` field with each answer
- ☐ Frontend tracks `time_spent_sec` per question
- ☐ Skill taxonomy defined for all modalities
- ☐ Mastery levels displayed in UI

- ☐ Progress tracking dashboard implemented
- ☐ Day 1-90 content mapped to specific skills

Contact & Support

For API questions or issues, please refer to:

- Main API docs: `/docs` (FastAPI Swagger UI)
- API schema: `/redoc` (ReDoc)
- Code repository: Check session service and skill mastery service implementations