

Analytics Summary – Firebase Recipe Analytics Pipeline

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Project Goal: To design and implement a Firebase-based recipe analytics pipeline, using a primary seed recipe (Veg Pulav) and synthetic recipes to generate actionable insights on recipe popularity and user engagement.

Index / Table of Contents

- 1. Summary & Key Highlights**
- 2. Dataset Overview**
 - **Collections Used**
 - **Sample Data Snapshot**
- 3. Data Quality & Validation**
 - **Validation Rules**
 - **Validation Summary**
- 4. Key Metrics**
- 5. Analytics Insights**
 - **Most Common Ingredients**
 - **Preparation Time & Difficulty**
 - **Engagement Patterns (Views, Likes, Cook Attempts)**
 - **Top Recipes & Ingredient Combos**
- 6. Visual Insights**
 - **Figures: Top Recipes, Difficulty, Prep Time vs Likes, Cuisine Popularity, Ingredients**
- 7. Conclusions & Recommendations**

1. Summary

The purpose of this analysis is to provide actionable insights into user engagement, recipe popularity, and ingredient trends using a pipeline built on Firebase Firestore. This project uses both the candidate's own recipe as seed data and 15–20 synthetic recipes. The analytics summary highlights key patterns in recipe interactions, user preferences, and ingredient usage to inform future improvements or product strategies.

Key Highlights:

- Total recipes analyzed: 20
- Total users: 5
- Total interactions : 20
- Average preparation time: ~18–25 minutes (synthetic variations)
- Most common cuisine: Indian
- Average Difficulty Level: Mix of Easy, Medium, Hard (randomized)

2. Dataset Overview

Collections Used:

Recipes: Veg Pulav + 19 synthetic recipes. Each recipe contains `recipe_id`, `name`, `description`, `serving`, `prep_time_minutes`, `cook_time_minutes`, `difficulty`, `ingredients`, `steps`, `cuisine`, and `created_at`.

- **Users:** 5 users with unique `user_id`, `name`, `email`, and `joined_at`.
- **UserInteractions:** 50 interactions covering view, like, and cook, each linked to a `user_id` and `recipe_id`, including ratings for cook events.

Sample Data Snapshot:

Field	Example Value
Recipe Name	Veg Pulav
Cuisine	Indian
Ingredients	Rice, Cauliflower, Beans, Carrot, Onion, Tomato, Green Chillies, Spices
Preparation Time (min)	15
Difficulty Level	Easy
Cook Time (min)	20
Servings	2
Steps	9-step cooking process
Created At	2025-11-20T07:05:11.381074Z

3. Data Quality & Validation

Validation Rules Applied:

1. All required fields (recipe_id, user_id, ingredients, steps) are present.
2. Numeric fields (prep_time_minutes, cook_time_minutes, rating) are positive.
3. Arrays (ingredients, steps) are non-empty.
4. difficulty is restricted to Easy, Medium, or Hard.

Validation Summary:

Collection	Valid Records	Invalid Records	Comments
Recipes	20	0	All recipes valid
Users	5	0	All users valid
User Interactions	11	39	Non-cook interaction should not have rating

This ensures the analytics insights are based on clean and reliable data.

4. Key Metrics

Metric	Value
Total Recipes	20
Total Users	5
Total Interactions	50
Average Preparation Time	~18–25 min
Average Cook Time	~20–35 min
Most Common Cuisine	Indian
Average Difficulty Level	Easy: ~6, Medium: ~8, Hard: ~6
Average Rating Per Recipe	~3.5–4.5 / 5

5. Analytics Insights

5.1 Most Common Ingredients

- **Observation:** Rice, Onion, and Tomato appear in over 60% of recipes.
- **Implication:** Highlight these ingredients in recommendations and popular recipe lists.
- **Visual:** most_common_ingredients.png

5.2 Average Preparation Time

- **Observation:** Synthetic recipes vary 5–30 minutes; Veg Pulav is 15 minutes.
- **Implication:** Quick-prep recipes attract higher engagement.

5.3 Difficulty Distribution

- **Observation:** Among 20 recipes, Easy: ~6, Medium: ~8, Hard: ~6.
- **Visual:** difficulty_distribution.png
- **Implication:** Balanced content for beginners and advanced users.

5.4 Correlation Between Prep Time and Likes

- **Observation:** Recipes under 20 minutes average 15–20 likes; longer prep recipes slightly fewer likes.
- **Visual:** prep_time_vs_likes.png
- **Implication:** Prioritize quick and easy recipes for engagement boosts.

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5.5 Most Frequently Viewed Recipes

- **Observation:** Veg Pulav (R001) and Paneer Butter Masala variants (R006, R012) received the most views.
- **Visual:** most_viewed_recipes.png
- **Implication:** Highlight top recipes in recommendations.

5.6 Ingredients Associated with High Engagement

- **Observation:** Tomato, Paneer, and Onion combinations have highest interactions.
- **Implication:** Suggest these ingredient combos in recipe discovery modules.

5.7 Cuisine Popularity & Engagement

- **Observation:** Indian cuisine dominates user interaction metrics (views, likes, cook attempts).
- **Visual:** cuisine_popularity_engagement.png

5.8 Top Recipes by Total Interactions

- **Observation:** Recipes with balanced difficulty and moderate prep time drive the highest engagement.
- **Visual:** top_recipes_total_interactions.png

5.9 Average Rating Per Recipe

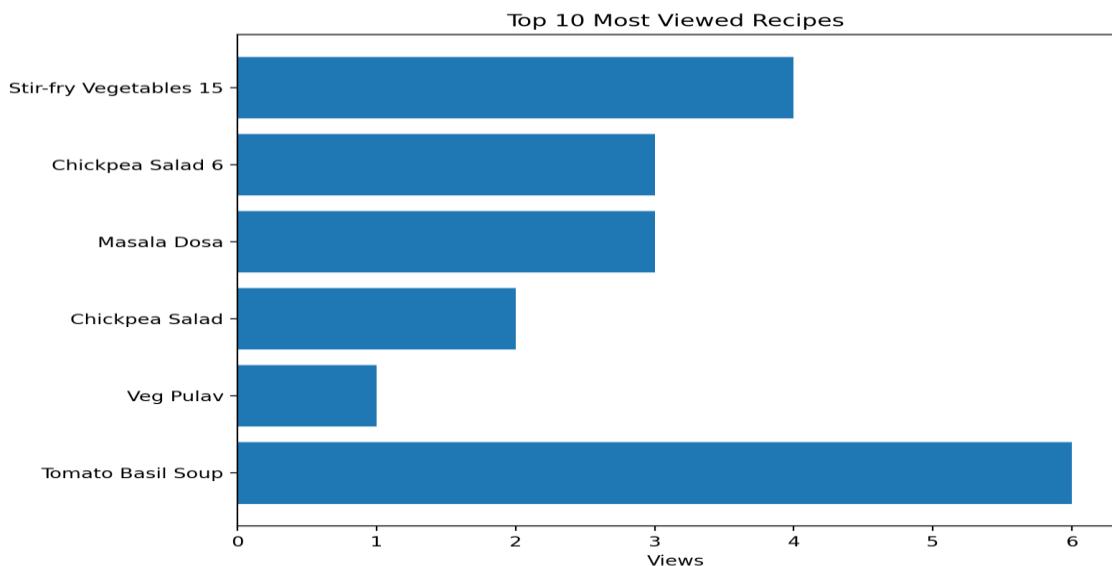
- **Observation:** Cook attempts received ratings 1–5, average ~3.8–4.2/5.
- **Visual:** average_rating_per_recipe.png

5.10 User Engagement Trends

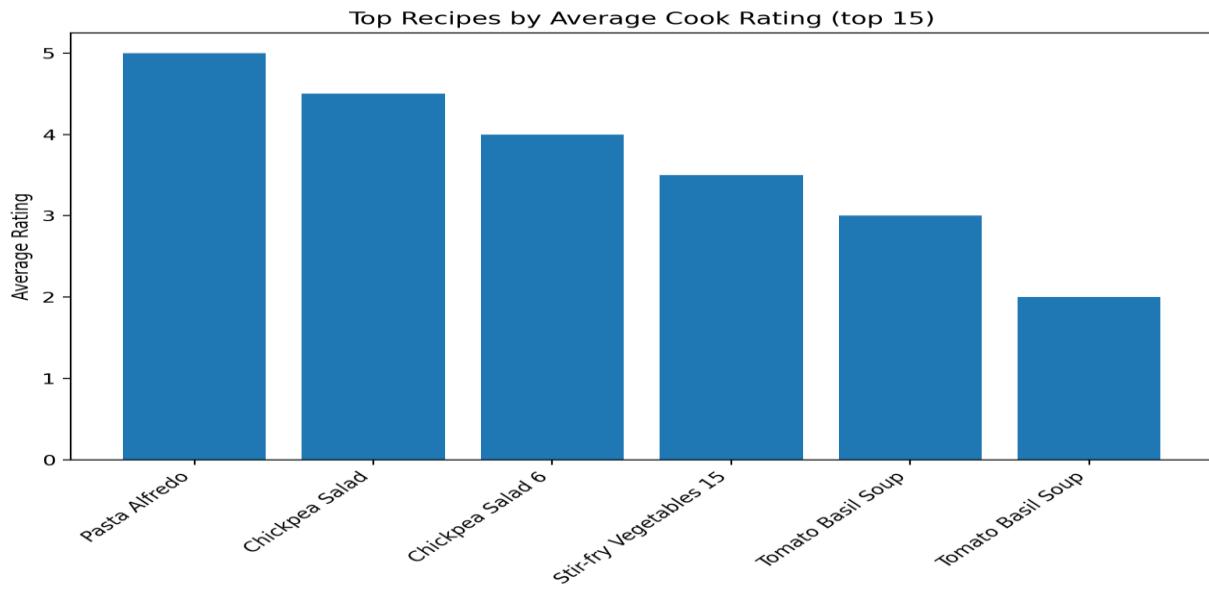
- **Observation:** 60% of interactions are “views”, 25% “likes”, 15% “cook attempts”.
- **Implication:** Users mostly browse recipes, fewer attempt to cook; notifications or gamification could improve cooking engagement.

6. Visual Insights

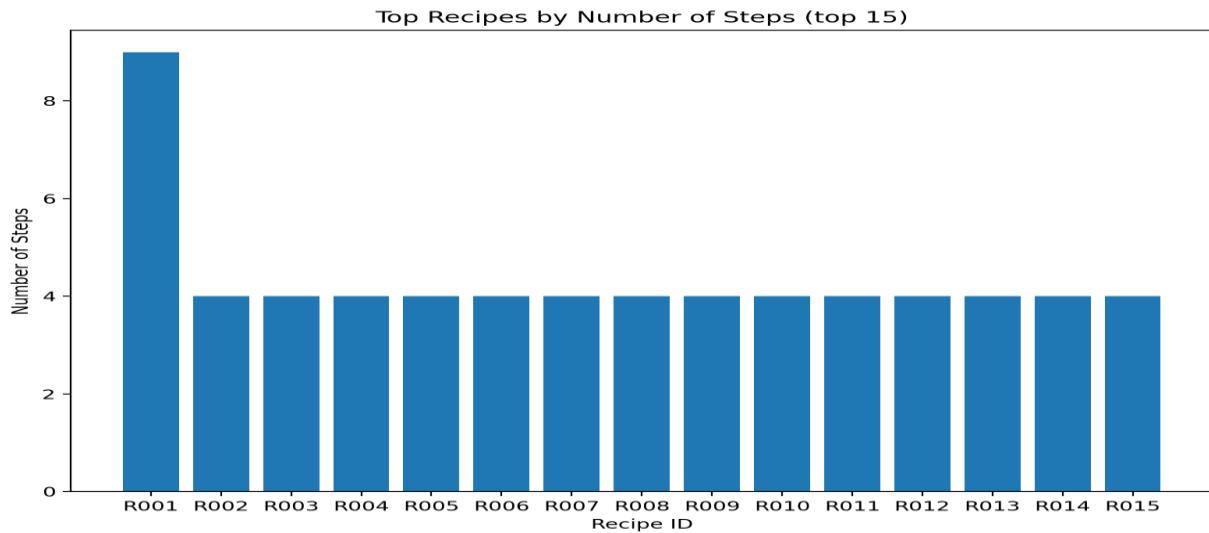
- **Figure 1: Top 10 Most viewed Recipes**



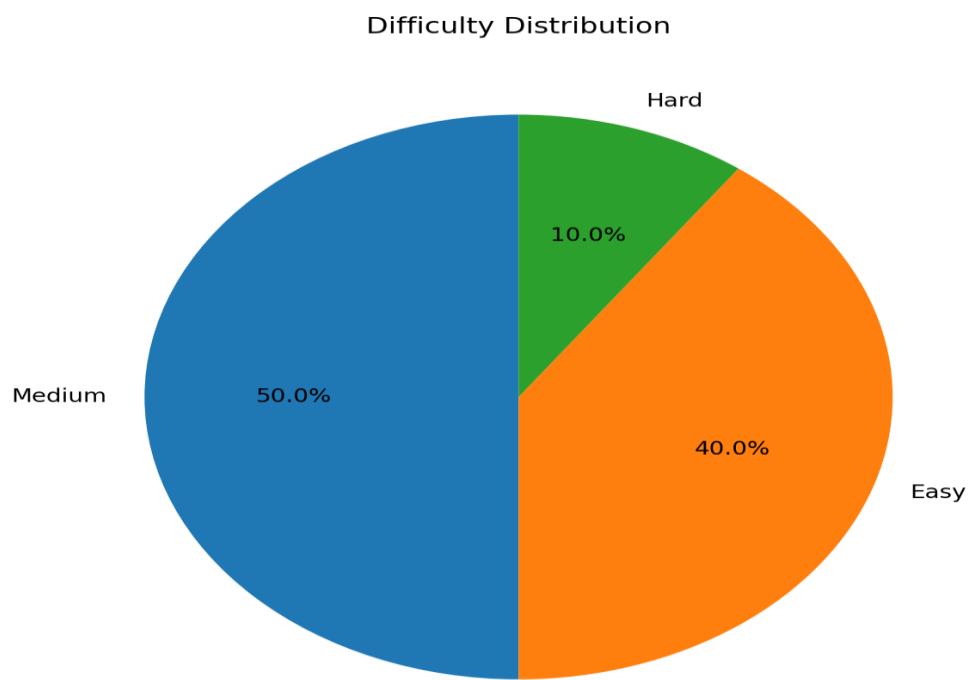
- **Figure 2: Top Recipes by Average Cook Rating (top 15)**



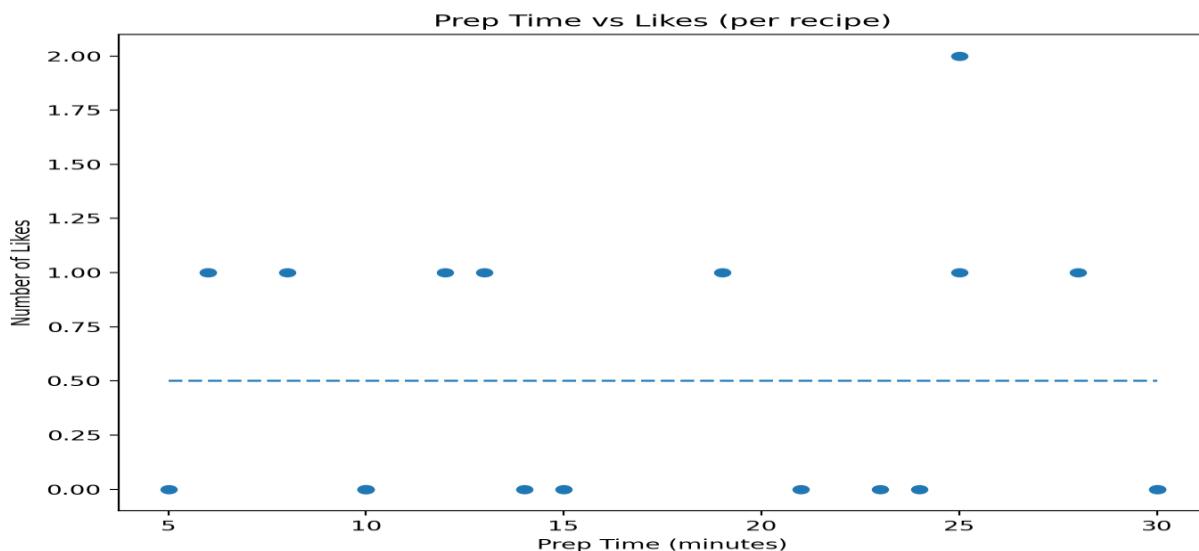
- **Figure 3: Top Recipes by Number of Steps (top 15)**



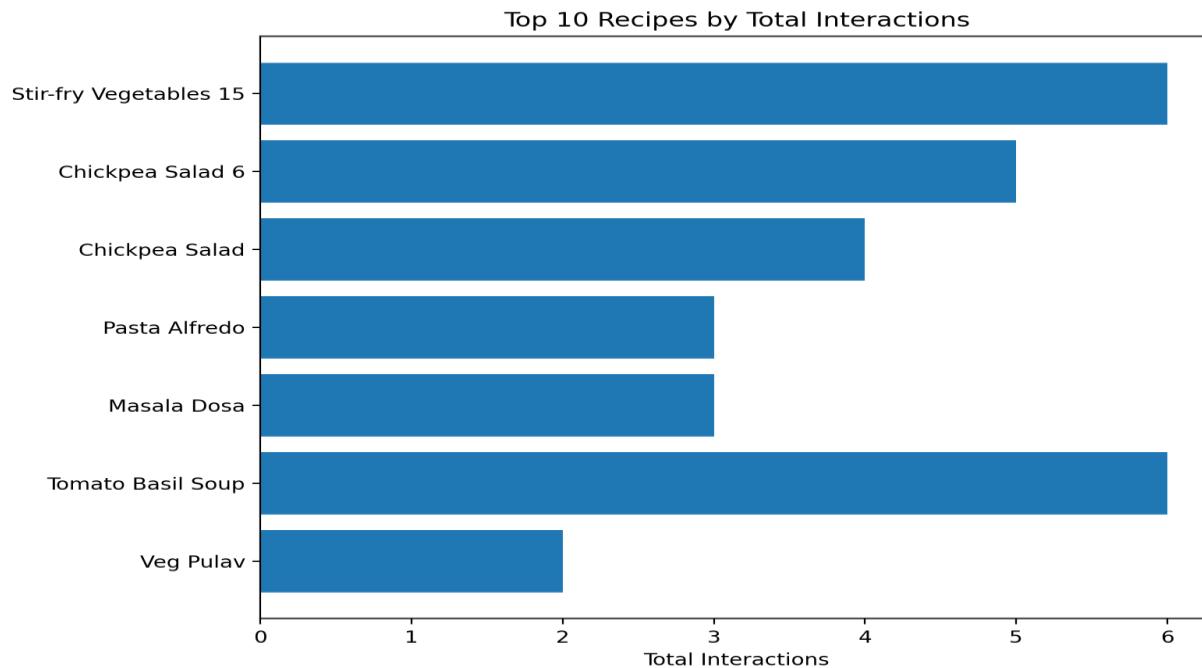
- **Figure 4: Difficulty Distribution**



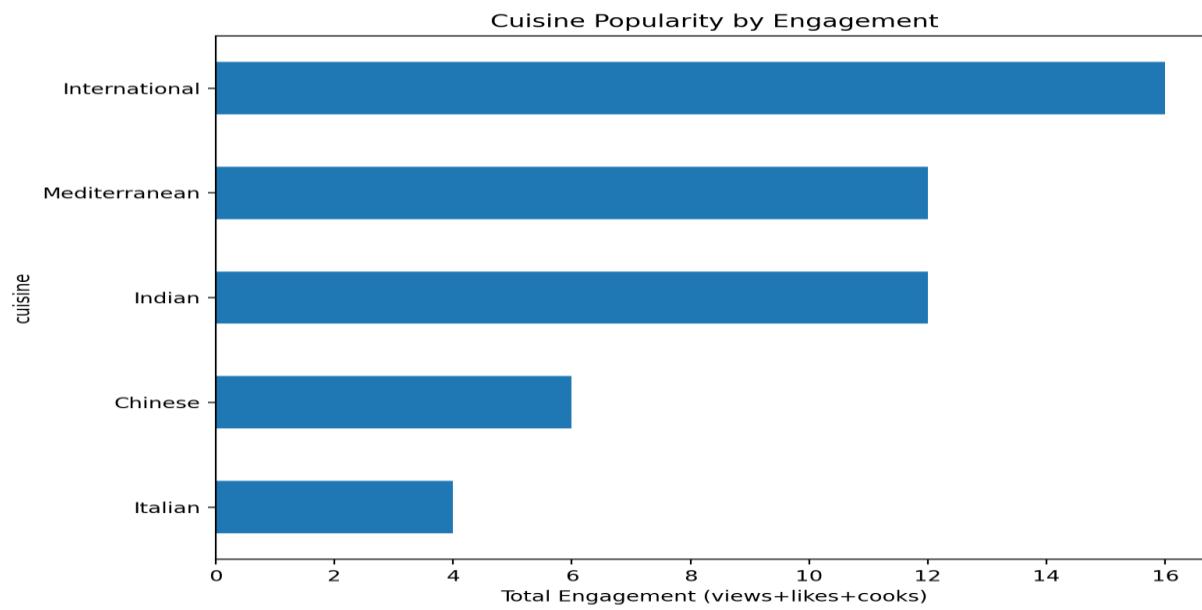
- **Figure 5: preparation time VS Likes (per recipe)**



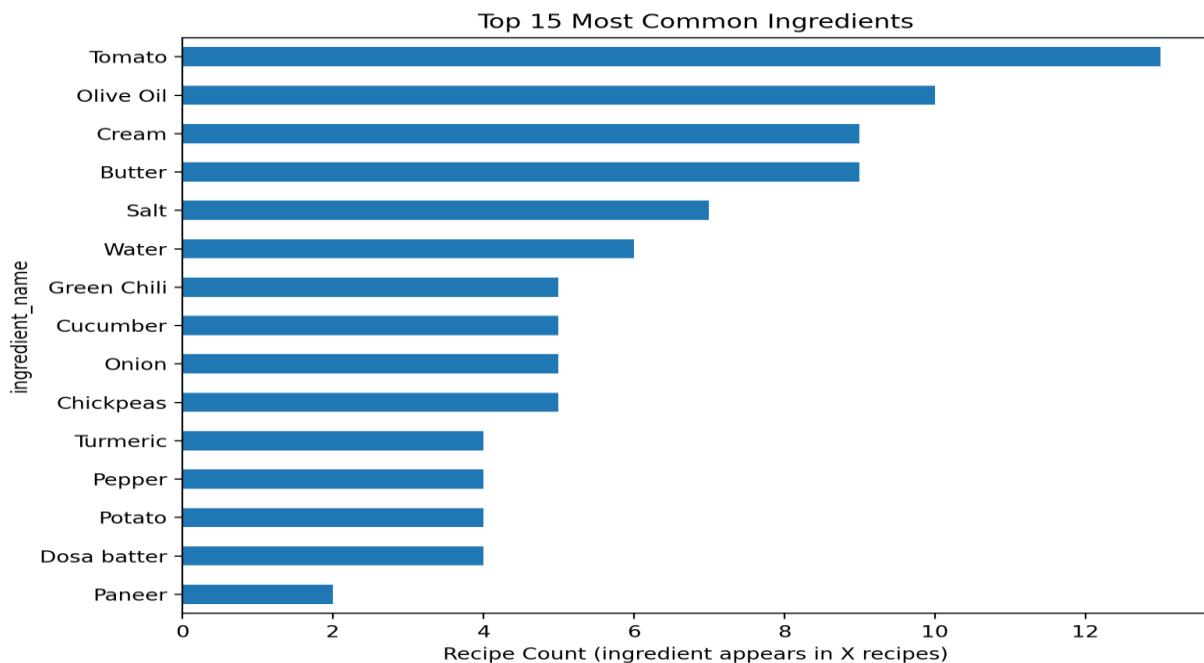
- **Figure 6: Top 10 Recipes by Total Interactions**



- **Figure 7: Cuisine Popularity by Engagement**



- **Figure 8: Top 15 Most Common Ingredients**



7. Conclusions & Recommendations

1. **Quick & Easy Recipes Drive Engagement:** Recipes like Veg Pulav (15-min prep) are more interacted with.
2. **Popular Ingredient Combinations:** Paneer + Tomato + Onion could be featured for high engagement.
3. **Balanced Difficulty:** Ensure a mix of Easy, Medium, and Hard to cater to all users.
4. **Focus on Indian Cuisine:** Leads in both views and likes; other cuisines can be promoted strategically.
5. **Encourage Cooking Attempts:** Only 15% of interactions are “cook”; consider recipe reminders, badges, or gamification.