

SmartCooky: Empowering Young Adults to Learn Cooking in a Personalized Environment

Design and Evaluation of an Accessible, Engaging, and Interactive Cooking App

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Cooking is a vital skill for independent living, yet many young adults struggle with learning to cook due to inaccessible resources, time constraints, and a lack of engagement. *SmartCooky* addresses these challenges by offering a personalized, interactive app that teaches cooking through a step-by-step, scaffolded approach. The app begins with simple recipes and gradually introduces more complex ones, helping users build confidence and master essential skills. Beyond providing recipes to users, *SmartCooky* also focuses on metacognition by encouraging users to reflect on their cooking experiences, customize their dishes, and continuously improve over time. Features like hands-free scrolling, interactive feedback, and a community space for sharing creations foster a fun and social learning environment while emphasizing accessibility. *SmartCooky* empowers young adults to learn cooking at their own pace, save money, and create meals tailored to their dietary needs and tastes, all while connecting with a supportive community. This project is designed to make cooking a more approachable and enjoyable experience for those looking to gain independence and culinary confidence.

CCS CONCEPTS • Human-centered computing → User-centered design; Empirical studies in HCI; Accessibility design and evaluation methods • Applied computing → Education → Interactive learning environments

Additional Keywords and Phrases: cooking, personalized, young adults, educational technology, accessibility, self-paced learning, scaffolding, app, dietary restrictions

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1 INTRODUCTION

Many young adults need help to cook for themselves and are often reluctant to teach themselves how to do so. This reluctance stems from several barriers, including a lack of foundational knowledge, limited resource access, and time constraints. The numerous resources available online fail to comprehensively address the multifaceted skills needed to become proficient in cooking while motivating. Many platforms lack key features such as rapid feedback, adaptability for different user needs, or the promotion of reflective learning practices to improve user competency beyond completing individual recipes. Furthermore, Bernardo et al. highlight that college students often do not pursue learning cooking due to demanding schedules and responsibilities, providing a significant barrier to acquiring sufficient cooking skills [1].

This paper introduces *SmartCooky*, an accessible, engaging, and interactive cooking app designed to educate and empower young adults. The app aims to help users become confident cooks while promoting healthier, more independent, and fulfilling lifestyles. To develop *SmartCooky*, user research was conducted, a prototype was designed, and the prototype was tested with participants in a simulated environment. This paper evaluates the results

of this iterative process, highlighting how the app addresses user needs and overcomes common barriers to learning how to cook.

2 BACKGROUND

The transition to adulthood is critical for developing self-sufficiency, particularly in managing one's diet and nutrition. Young adults must navigate a significant shift, often transitioning from relying on caregivers for meals to preparing their own. Without adequate knowledge, this shift can result in unhealthy eating habits and reliance on fast food or pre-packaged meals, which fail to meet nutritional needs. Wang et al. explain that this transition frequently leads to "dietary maladaptations" due to insufficient cooking knowledge, underscoring the need for educational interventions targeting this demographic [4]. Similarly, Wickham and Carbone note that adolescents and young adults consume far fewer fruits and vegetables than recommended, often opting for convenient but nutritionally poor food options. They argue that fostering cooking skills at this stage can help mitigate unhealthy dietary patterns and promote lifelong healthy eating habits [5].

2.1 Barriers to Learning How to Cook

A common barrier young adults face in learning to cook is the lack of access to intuitive resources or supportive environments. For instance, some individuals may not have parental figures to teach them foundational cooking skills. Platforms like "Dad, How Do I," a YouTube channel designed to provide life-skill tutorials, cater to users who lack traditional familial support. Although it offers effective visual demonstrations, the platform's lack of pacing adjustments and structured progression in teaching limits its educational impact. Financial constraints also pose a significant challenge, as young adults with limited budgets may find it easier to purchase inexpensive, pre-prepared meals rather than invest in cooking equipment or ingredients needed to practice their skills. Mechling further asserts that the cost associated with learning to cook can deter individuals, highlighting the need for accessible and affordable educational tools [3].

Time constraints also significantly hinder young adults from pursuing cooking education. As Bernardo et al. emphasize, college students often face demanding schedules, leaving little room for activities such as cooking, which require both time and planning [1]. Platforms like Tasty attempt to address this barrier by providing quick and accessible recipes. While this app offers a variety of instructional formats and caters to users with limited free time, it lacks the depth needed to help users progress from beginner to intermediate cooking skills.

2.2 Limitations of Existing Solutions

Despite the abundance of online cooking resources, few platforms effectively address the combination of foundational skill-building, community support, and adaptable learning needed to foster cooking competency. For example, WikiHow and YouTube channels like "Dad, How Do I" allow users to learn at their own pace but struggle to ensure the accuracy of their content and provide motivation. WikiHow's reliance on community management raises concerns about fact-checking and the credibility of its material. Similarly, while YouTube's comment sections offer opportunities for interaction, they rarely provide constructive feedback or facilitate learning [3]. Platforms like Tasty and Zest Cooking excel in specific areas, such as offering diverse recipes or modular lessons. However, they often fail to connect foundational skills to more advanced techniques, limiting their ability to promote sustained learning [4].

AI-powered solutions present another avenue for addressing cooking education, but current models face significant limitations. Frummet et al. highlight that AI systems like QookA often fail to replicate the full spectrum of information needs that arise during the cooking process. Users frequently ask questions about ingredient substitutions, cooking techniques, or measurements, which current AI databases struggle to answer comprehensively. Although these models show promise in enhancing cooking education, they cannot fully support users through the diverse and dynamic challenges of the cooking process [2].

2.3 The Need for Holistic Solutions

Given these challenges, there is a clear need for more comprehensive and user-centered approaches to cooking education. Effective solutions must address the barriers of time, cost, and accessibility while providing structured and progressive learning opportunities. Incorporating features such as tailored feedback, adaptive content, accessibility, and robust community support can help young adults build confidence and proficiency in cooking. Leveraging AI technologies to provide real-time guidance and address diverse user queries also holds the potential for enhancing

the learning experience. By addressing these gaps, future cooking platforms can empower young adults to develop essential life skills and establish healthier dietary habits.

3 RESEARCH AND DESIGN PROCESS

The research and design process was started by conducting a preliminary user study that assessed the target user group's barriers and motivations for learning how to cook and was followed by creating an initial prototype based on design goals established from these interviews. After adjusting this prototype based on feedback, user research was conducted to provide insights about the app's interface elements and its effectiveness in teaching culinary skills—these evaluations guided plans for future updates and revisions of the final prototype.

3.1 Preliminary User Study

In the initial user study, interviews were performed with 15 potential users, discussing key struggles they face with learning to cook and what they find essential in systems built for teaching these skills.

A primary barrier faced by our users was a lack of time and motivation, with interviewees noting that “[cooking] takes time and practice” as well as admitting feeling “lazy” leading to a lack of drive and motivation. In addition, many students and young adults explained a struggle to prioritize learning how to cook due to competing responsibilities, such as school or work. Another potential user reported experiencing engagement fatigue when their hard work on a meal does not pay off and results in a poor product. This feeling makes the effort put in feel less worthwhile and stifles future attempts. There was also discussion of accurate cooking information being a barrier for some users, as they described having to “fight through the noise” to make sure what they were looking at was accurate and trustworthy, which is daunting for some users.

3.2 Design Requirements

After conducting preliminary user research, we settled on two main design requirements before we started prototyping. The first was building a scaffolding-based learning model in our lessons because it is important for learners to get comfortable with basic cooking techniques and how to use all the necessary equipment before moving on to more complicated recipes. Additionally, some feedback we received in interviews included learners feeling overwhelmed trying to learn everything about cooking all at once, so compartmentalizing lessons into digestible modules that build off one another would mitigate this concern. The second design requirement we agreed on was providing summative feedback at the end of modules as a quiz so that learners could assess for themselves if they were ready to proceed with a recipe. If they didn't pass the quiz, they could complete the module again to ensure they had the necessary knowledge to complete the recipe the module focuses on.

3.3 Preliminary Design

Several different goals guided the initial design. One focus was creating an app personalized to users' specific needs in the context of cooking education. The prototype featured an onboarding questionnaire about users' dietary restrictions, protein preferences, spice tolerance, preferred ingredients, and allergies. This sequence of onboarding screens is pictured below.



Figure 1: Images of screens from the preliminary prototype's onboarding process, including questions about dietary restrictions and preferences.

Another focus was to provide self-paced learning modules that provide fast and intuitive lessons about various fundamental cooking skills. Following the onboarding process, users are provided with several learning modules that match their needs, each featuring intuitive learning paths with lessons and assessments. These modules and learning paths are pictured below.



Figure 2: Images of screens featuring (a) learning modules, (b) the sequential learning path for 'Cooking with Eggs', (c) part of the lesson on scrambled eggs, and (d) part of the assessment for 'Egg Basics'.

The prototype also allowed for recipe generation based on users' dietary preferences and skills acquired by completing modules and lessons. If users are happy with the recipe, they can save it to their cookbook. After users complete these recipes, they can complete a recipe feedback form that assesses their satisfaction with their results for future recipe fine-tuning. Users can also adjust the dietary preferences and restrictions they established in the onboarding process in the app's settings. The screens below display these functions.



Figure 3: Images of screens featuring (a) an AI-generated recipe, (b) a rating screen that allows users to provide feedback and reflect on results, (c) users' cookbook screen that includes their saved recipes, and (d) the settings page that allows for adjustment of dietary preferences.

3.4 Design Updates

To keep users motivated as they progress through the learning path, we added check-in prompts that guide the user as they cook. We also enhanced the feedback feature to include more recipe-specific formative feedback. This would let users reflect on their cooking experience by typing notes about modifications they would like to make after following the AI-generated recipe. As the user keeps practicing and cooking, they can use the app's recipes and add feedback depending on their tastes and food preferences. Additionally, we have added a new option for users to share photos of their cooked meals with others, to incentivize learners and foster a sense of community. *SmartCooky* has a hand-free scrolling accessibility feature based on the user's motion. We updated the design to include a toggle above the lesson plan.



Figure 4: Images of updates that include (a) Check-in prompts, (b) Feedback to modify recipes, (c) Option to share results (d) Toggle for the motion-based accessibility feature

3.5 Summative Evaluation

SmartCooky has evolved significantly over the semester, with every stage of development shaped by user feedback and a focus on addressing real needs. In our initial user study, some of the main challenges of cooking that we found, included a lack of time, lack of motivation, and considerable difficulty in finding reliable sources for cooking. The data we gathered from our P1 interviews became guidelines for our initial design. The findings influenced the app's design from the start, leading to features like modular lessons, scaffolding-based learning, and personalized recipe recommendations tailored to individual preferences.

Throughout the semester, *SmartCooky* was refined to make the app more intuitive and engaging. Some of the updates we included, like check-in prompts, enhanced feedback options, and the ability to share recipes were added to keep users motivated and foster a sense of community. Accessibility was also prioritized at the forefront of *SmartCooky's* development with the inclusion of hands-free scrolling and the consideration of a wide range of dietary needs and preferences.

These iterative changes reflect how the project has grown to support users' better goals. *SmartCooky* is now a thoughtfully designed tool that balances education with usability, making it easier for people to build cooking skills at their own pace. The process of adapting the design to feedback has been central to its development, ensuring it meets users' needs while remaining simple and enjoyable to use.

4 DISCUSSION

The design, development, and impact of *SmartCooky* are important to the field of educational technology as they document the process and end product choices of a tool that can be used to benefit a large swath of the population in the critical area of cooking. Many intentional decisions were made throughout the process and end product to provide the most intuitive, accessible, and beneficial teaching tool for this target area.

4.1 Key Takeaways

Throughout our final prototype development and end-user testing, we found certain areas of the product that could further be improved.

- Increase personalization of the system through an onboarding assessment and more dietary preferences/restrictions (add religious restrictions, diets, etc.).
- Restructure the color palette to increase contrast and improve intuition.
- In addition to motion-based paging and videos, narration, vocal cues, and similar interactions would improve lesson navigation.
- Improve the recipe rating process to be clear and encourage user interaction to better personalize the app's content.
- Saving and sharing recipes benefitted users' motivation.
- Allow the user to directly modify the recipe and have the app take into account the modifications to further personalize the app.

4.2 Connection to ACES

Our project focuses primarily on the Accessibility portion of ACES with some connection to the Collaboration aspect. We found early on that cooking is a vital skill for independent living, so we wanted to focus on accessibility to provide as many learners as possible the opportunity to improve their skills. Because cooking can seem like such a daunting task for many inexperienced young adults, we wanted our project to take the least intimidating approach, so to make it more accessible to complete beginners, we implemented our scaffolding-based learning model that doesn't throw complicated recipes at learners who aren't ready but instead builds up knowledge and confidence incrementally to maximize learner success. We also didn't want our project to limit learners based on dietary restrictions, so we included many options in our onboarding process that would customize lessons based on what users could and could not eat; however, this feature could still be expanded further. Another feature that makes our app accessible is the hands-free navigation mode, which can be helpful for users who don't want to get ingredients all over their phone while navigating a recipe and for those with certain motor impairments that make scrolling on a small screen difficult. The 'Share Recipe' feature includes a collaborative aspect as learners can try out recipes other users have created

and share their own, creating a community of learners going on their cooking journey together. This community could be more fully fleshed out to include more direct collaboration in future project iterations.

4.3 Limitations and Future Work

SmartCooky mainly targets young adults who want to learn how to cook from the basics. Not all of the app's features will be optimal for those who know how to cook moderately well, to cooking experts. This limitation also came up during user research as well. Interactive cooking challenges could enable intermediate cooks to refine their skills and explore new techniques. Though *SmartCooky* offers a toggle for hands-free accessibility features, it does not fully accommodate users with disabilities, such as visual impairments. Future updates could include voice-guided navigation and compatibility with screen readers. A feature that recommends recipes based on the users' currently available ingredients could also be added.

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A APPENDICES

A.1 Team Member Project Contribution

Table 1: Team member project contribution

Team Member	Contribution
Marcel Dunat (U)	P1: worked on "Literature/Technology Review" section; P2: worked on Figma screen design; P3: drafted user research plans; P4: conducted user interviews, worked on updating Figma design/prototyping based on feedback, completed "Final Design" section, worked on poster's design; P5: completed "Preliminary Design" section and "Research and Design Process" intro/overview
Matthew Free (G)	P1: finalized "Divergent Designs" section, final review; P2: prototyped the Figma design, recorded the presentation; P3: created schedule; P4: final review of the script, initial layout of the poster, completed "Findings" and "Key Takeaways" sections; P5: created and stubbed the document, wrote "Introduction", flushed out "Background" section, wrote "Discussion" overview section, wrote "Key Takeaways" section
Sreehitha Kalagara (U)	P1: Studied Duolingo and wrote the "Qualitative Analysis" section; P2: Worked on the Figma prototype; P3: Reviewed before turning in but mostly worked on P2 because they were due the same day; P4: Conducted user interviews, worked on updating the Figma prototype based on feedback from Prof. Roberts and the users; P5: Completed the "Summative Evaluation" section and the abstract
Subiksha Senthil (G)	P1: Discussed with the team on ways to create a learning tool based on existing platforms. P2: helped prototype the design in Figma and designed Learning Path; P3: helped work on user research; P4: conducted 2 interviews for external view and feedback; P5: worked on writing sections 'Design Updates' and 'Limitations and Future Work'
Michael Stamey Jr. (U)	P1: Worked on the "Literature / Technology Review" section. P2: Worked on PowerPoint Presentation: P3: Helped plan initial user research P4: wrote interview scripts for both guided and unguided learning scenarios. Conducted user interviews P5: Wrote initial drafts of 'Background', and 'Preliminary Users' sections
Mia Trocchi (U)	P1: created Logic Model and wrote 'Project Outline' description; P2: worked on PowerPoint presented in the video; P3: brainstormed expected design changes, intended research contexts, and learner activities; P4: conducted user interview for further research, completed 'Design Requirements' section of the poster; P5: wrote 'Design Requirements' and 'Connection to ACES' section

A.2 Figma Prototype

SmartCooky's Figma Prototype: <https://tinyurl.com/smartcooky>