The Design and Evaluation of a Serious Cooking Game for College Students

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Abstract

This paper represents part of a design-development cycle for a serious game that targets college students. The objective of the project lies in designing a game that influences nutritional lifestyles through cooking experiences focusing on issues surrounding students' eating habits and gaming preferences. A survey was administered at the IU Bloomington campus and fifty two responses from both undergraduate and graduate students were gathered. The level of skill and interest students have in cooking were observed and the factors that influenced their cooking and eating habits were identified. In addition, their gaming habits were asked in order to determine appropriate platforms for this project. Based upon the requirements from the survey results, prototypes were created. Using this data, a set of user-requirements and usability goals were also created. A focus group of six undergraduate students was conducted to evaluate the initial design and the initial prototypes were adjusted according to the data collected from the focus group. Finally, an evaluation of redesigns was conducted utilizing seven heuristics: Visibility of system status; Match between the system and the real world; Flexibility and efficiency of use; Aesthetic Design; Help and Documentation; Structure of Information; Physical Constraints and Extraordinary Users. Although integrating educational and useful scenarios with a game that is also engaging and entertaining is the challenge, thanks to the user-centered design method, the final product was substantially improved over the initial ideas.

Introduction

The purpose of this project has been to create prototypes of a video game targeted towards a college-student audience. The game should address an issue commonly facing college students while providing guidance, education, and an enjoyable gaming experience. Moreover, within this project we have worked to successfully coordinate and execute various methods of user-centered design and evaluation of our prototypes in an effort to produce a game that would fulfill the requirements mentioned above.

One issue facing college students today is that of inadequate nutrition. In one longitudinal study of college students, 15% of freshmen were found to be overweight or obese and by senior year, that number had risen to 23% (Racette et al., 2008, p. 40). In concert with physical activity, one factor affecting the health of college students is nutrition, and the same study found that "fewer than one third of the participants in this study consumed the recommended servings of fruits and vegetables during freshman or senior assessments" (p. 42). There are a number of behavioral

influences that affect the diet of college students. In their 2011 focus group study, LaCaille et al. identified several key influences in the diet of college students, including motivation to eat healthfully and self-control, alcohol use, convenience, cost, lack of time, lack of healthy options in campus dining facilities, and the need to cook for oneself off campus (p. 533). La Caille et al. also discovered that the transition to living off-campus and therefore being responsible for obtaining food outside of campus dining facilities was a real turning point for students: "For some, having control over shopping and preparing meals translated to eating healthier. For others, however, the transition to off-campus life meant purchasing more fast/convenience foods, which was perceived to have a negative impact" (p. 535).

We felt that focusing on issues surrounding students and their cooking and eating habits would be an excellent basis for this project. Currently, a number of video games that simulate cooking experiences already exist, the most popular and recognizable being *Cooking Mama,* available on a number of platforms including the Nintendo3DS, Wii, and for mobile devices[1]. However, our goal here was to design a game that, beyond simulating cooking, would impart its intended users (college students) with tools to navigate the issues that impact their nutritional lifestyles. Hence, we decided that we could build upon an already-popular genre in video games to create a design that would be more directly relevant and useful for students. Integrating activities that students would find educational and useful in real-world scenarios with a game that is engaging and entertaining is the challenge in this design.

In this paper, the we will discuss the methods used to complete this project. First, we made use of a survey to determine precisely what the college students' needs would be. Those surveyed consisted mostly of undergraduate students, with some graduate students also reporting. We observed the level of skill and interest students have in real-world cooking and determined the factors that influence their cooking and eating habits. In addition, we asked students about their gaming habits in order to determine what sort of platform might work best for this project. Using this data, we created a set of user-requirements and usability goals to use for the basis of our design prototypes. Once those prototypes were created, we embarked on a focus group of six undergraduate students living off-campus to evaluate our design in the context of their cooking and eating habits and gaming preferences. Using the data collected from the focus group, we updated our prototypes to better fulfill our user-requirements and engaged these updated designs in a heuristic evaluation. The results of the final heuristic evaluation will direct future areas of improvement and refinement in the development of the game.

User Centered Design and Evaluation

I. Data Gathering

Prior to the requirement gathering process, a questionnaire form was created for gaining a better insight into students' propensity for cooking and gaming. The questionnaire was comprised of three demographic

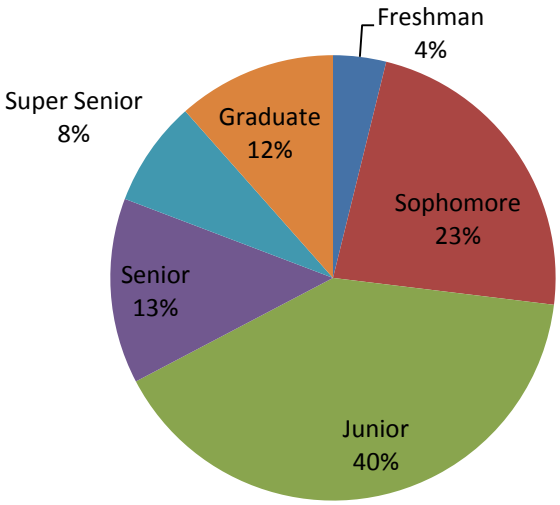
[1] For the full *Cooking Mama* franchise timeline, see the official site at: http://www.cookingmamaus.com/about.php

questions, three open ended questions asking students' preference of food and platforms, and five closed questions asking about cooking and gaming in general (See Appendix B). The questionnaire was administered out to IU students at different locations around the Bloomington campus and 52 responses were collected from October 24th to October 27th. The following information was asked in the survey:

- Student status
- Residence on-campus or off-campus
- Academic major
- Skill level of cooking
- Cooking Frequency
- Favorite meals to cook
- Favorite meals to eat
- Important factors in choosing what to cook
- Interest in cooking
- Frequency of playing video games
- Platforms for games

The survey results allowed the team to get a better understanding of the diverse demographics: juniors (40%); sophomores (23%); seniors (13%); graduate students (12%); super seniors (8%); freshmen (4%) (Figure 1). 67% of respondents lived off-campus, while 33% of respondents lived on-campus housing. As a part of survey was conducted in a computer science course, 51% of respondents (27 out of 52 respondents) were majoring in Computer Science. However, remaining respondents' school affiliation was diverse, including Mathematics and Business.

Figure 1. Student Status



When asked about their skill level at cooking, 57% said that they are intermediates and 17% said that they are beginners. The majority of respondents do not seem to cook often; only 6% of respondents answered that they cook daily and respondents who said they cook never, rarely, or monthly are over 57%.

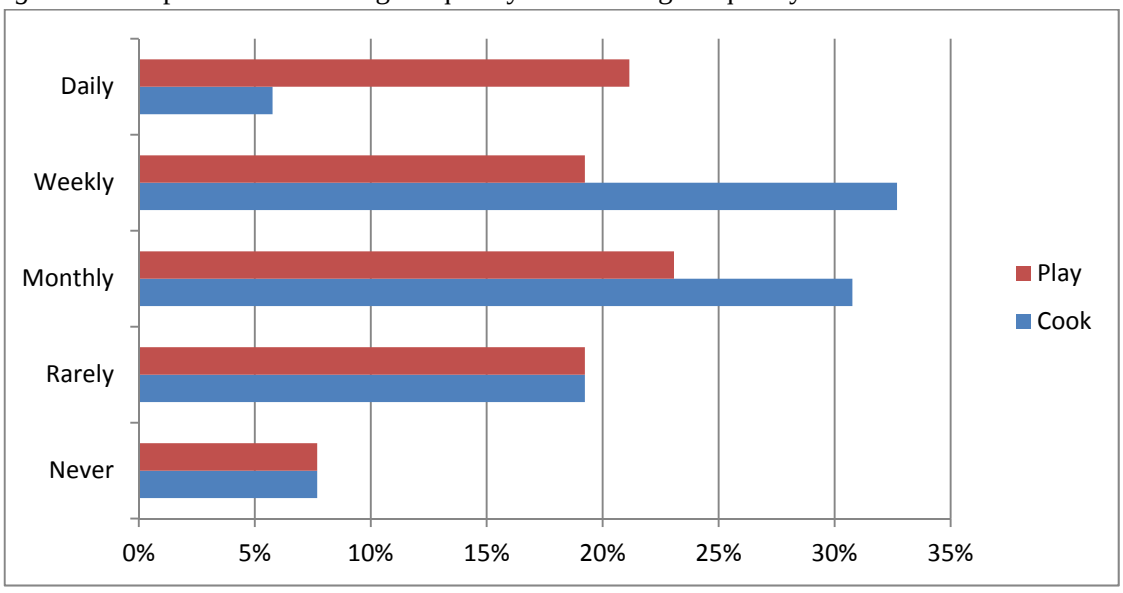
Additionally students were asked to rank the most important factor, “Taste, Cost of ingredients, Nutrition, Time/Convenience,” from 1 (most important) to 4 (least important) in choosing what to cook. Respondents considered “Taste” to be the most important factor, “Time” the second, and “Cost” the third. Interestingly, “Nutrition” was the last factor they chose (Table 1). With respect to their interest level in learning how to cook, an average of 3.79 was marked out of 1-5 scale. Two open ended questions, in which respondents could list their favorite meals to cook and to eat, proved to be the most beneficial for understanding of students’ food preference. Most of them preferred either greasy food, such as pizza and pasta, or food convenient to cook, such as burgers and hot dogs.

Table 1. Students’ importance rank on Taste, Cost, Nutrition, and Time

	Importance Rank
Taste	1.72549
Cost	2.62745
Nutrition	2.94118
Time	2.29412

27% of respondents said that they never or rarely play video games, whereas most of the respondents (63%) play video games monthly or weekly and a little over 21% play daily. PC was the most popular platform for video games and Xbox, Mobile devices, and Wii were also mentioned.

Figure 2. Comparison of Cooking Frequency and Gaming Frequency



The survey indicated that, although students seemed to be interested in learning how to cook, they didn’t or couldn’t spare time for it, and thus, their skill remains at intermediate level. Also, the authors could not find an advanced skill level among freshmen and sophomore. This result reflects the fact that most freshmen do not have opportunities to cook because they live in on-campus housing. When comparing cooking frequency with gaming frequency (Figure 2), it is obvious that the number of students who cook daily is much smaller than that of students who play video games daily, presumably because those who

game often are exposed more frequently to gaming devices than to cooking tools. It should be also noted that nutrition was the least preferred factor in choosing what to cook. College students are more likely to pay more attention to cost of ingredients and time/convenience factors than to nutrition except the taste factor.

II. Initial Designs

Cooking Student is comprised of three central areas: the "Recipe Box," the profile and settings, and the virtual kitchen in which actual game play takes place. Preliminary mock-ups of these screens are available in Appendix E.

A) Recipe Box

The Recipe Box is the central hub from which players access all other screens. The top left corner contains icons for the Profile and Settings screens, and the top right corner displays the player's statistics (health points, funds, etc.). The box in the center represents a traditional recipe box for filing index cards with recipes. After selecting a marker for a particular "level" of expertise, the player is presented with all of the recipes he/she can play.

B) Profile and Settings

These sections contain the information relevant to the players' progress and individualized options for the game play. The Profile displays the player's current ranking based on achievements, their earnings and funds, and their health meter based on the nutrition choices they made during recipe execution. The settings were not prototyped, but hypothetically allow the player to control elements like sound effects (on/off), animations (on/off), difficulty, etc.

C) Kitchen

The kitchen is the most fluid screen in the game. Though the basic structure remains the same across recipes, the layout of the counter will change significantly depending on the recipe chosen. In the top left corner is a list of ingredients with representative icons, removed from the counter due to space constraints. In the top right are icons for the recipe text, a timer, and a refrigerator icon representing the player's virtual stock. Players may purchase ingredients directly from the "refrigerator" to reduce complexity. The counter contains the appliances, tools, and workspace for players to complete the recipe. An example game play for "vegetarian pizza" is included in the Appendix E.

III. Focus Group

The focus group took place on a Monday evening in an off-campus apartment. Dinner was served to the students, and then one of the authors led a conversation with participants by introducing open-ended questions for discussion (see Appendix F for all focus group questions). Six undergraduates were recruited to participate: one sophomore, four juniors, and one senior; three were female and three male. The undergraduates worked together as engineering co-ops at Boston Scientific in Spencer, Indiana, and thus came from similar academic backgrounds and

were familiar with each other. Each lived off-campus, but attended different universities. We began with an introduction of ourselves and our project, describing the game's scenario and our goals for the design. The first portion of the questioning dealt with the cooking and eating habits of the students, in an effort to gain more in-depth answers to the types of questions we asked on the first survey.

The frequency of cooking and the skill-level of the students ranged widely between the group members. Some cooked frequently, like Gabi, a senior who liked to make big batches of food like pasta or salads on the weekend to parse out through the week while on campus. Others rarely cooked, like Sam, a junior who sticks to sandwiches and mac n' cheese when forced to cook. A common theme was communal meals between roommates and friends. Ryan, a junior, enjoyed social meals that involved easy foods like grilled meat and salads.

Most of the students expressed a dissonance between foods they most enjoyed eating and foods they cooked. Pasta and salad came up in conversation frequently, cited as being easy to make and change up, but the students enjoyed eating Thai food, Indian food, and sushi; they cited a lack of time and sufficient experience in cooking those types of foods as reasons for not cooking new dishes.

> "My mom stays at home so I've seen her cook things and she's a really, really good cook, so when she cooks food she gets it ready sometimes the night before, depending on the dish, and it just takes a lot of time. When she does cook she spends, like, 2 or 3 hours cooking the food [and] she puts a lot of time and preparation into it, and makes all the side dishes and makes sure everything is perfect. I can't see myself doing that, it takes a lot of effort." (Sam)

> "Yeah, it's definitely the effort thing, for me. I can't...I don't know how to have 3 hours or whatever to spend [on cooking]." (Ryan)

> "Yeah. Definitely time. Or, I guess 'time' is different from 'effort' but, just time. Like 90% of my meals I have to kind of grab on-the-go, which sucks, but I don't know...at the same time I've always wished I had more time in the day [because] I would feel so much better if I could make all my own food and just know everything that I was eating." (Christine)

The second portion of the focus group dealt with the types of games and platforms the students preferred to use. We included these questions to help us determine what sort of platform and user-control the students would like. Each of the students played games, but there was a range in the type of gaming the engaged in. Lindsay, a junior, played 'girly games' without any violence,

while Ryan liked sports and war games, like *Madden* and *Call of Duty*. Ben liked puzzle games. The students cited the X-Box 360 as the most frequently used gaming console.

Finally, we presented the students with our original paper prototypes. We asked them to perform navigational actions with our prototypes (e.g. “What action would you take to go to select the recipe?”). Students were able to successfully navigate the prototypes and, in general, had a positive reaction to the game’s concept, but indicated that the prototypes left room for improvement and expansion on the basic ideas we presented to them.

The students suggested some more clarity in regard to how players ascend the levels. They also requested that users be able to make more errors that might happen in real life, such as being able to burn their pizza in the oven, and that the game avatars make cooking motions according to the movements of players.

A big theme was personalization and customization. Ben suggested that the player be able to work for different restaurants, with changing thematic kitchen screens, which the others responded to positively. They also liked the idea of thematic menus (like Italian or Thai) and Gabi proposed the ability to change ingredients, such as from chicken to steak: “I like things where you have user input.” This was especially needed as the recipes are intended for use in real-life scenarios and different people like different foods. Christine suggested that vegan or vegetarian options would be both interesting and also useful for players. Other suggestions included special ingredients and cooking tools as bonuses or rewards within the game. The students also proposed allowing for competition and sharing between users. Sam suggested users could graduate from the game to build their own restaurant and create their own recipes to publish online, adding a social networking element to the game, which several others enthusiastically supported.

They wavered at whether the game would meet its goal at being a convenient source of new skills. Christine claimed that it depended on the skill-set of the player.

> “Convenient? I mean, it depends how terrible at cooking you are. I mean, you know, if you’ve got a basic skill-set of course, you know, I would rather just google a recipe and use that but literally if I had been starting from scratch? Yeah this would be the most convenient way and the most efficient because I’d be less likely to mess it up and everything’s right there.” (Christine)

However, Ben argued that playing through the recipes would make them more memorable (and therefore convenient) and Lindsay pointed out that if it were a mobile game and the recipe was available on her phone, shopping for the ingredients would be more convenient.

In all, the focus group offered us some new directions for the prototype design that would make playing through the game and reaching new levels clearer. It also offered us some ways to make the game and its recipes more convenient for use in real cooking scenarios and more tailored to the eating, cooking, and gaming preferences of students.

IV. Redesigns

After considering the feedback of the focus group, we made adjustments to our initial designs based on the weaknesses revealed. These updated designs are also included in Appendix G.

A) Recipe Box

A “start” page was added before the Recipe Box screen, including links to start a new game, open an existing profile, or view the *Cooking Student* tutorial. Because the focus group participants had indicated a strong preference for exotic recipes and customization, we opened the game to the possibility of themes. Within the “box” itself, we added the ability to customize the proteins of recipes to accommodate special diets.

B) Profile

Explanatory text was introduced to the profile section of the game, and we expanded the players’ past records. We also altered the health meter to a numerical percentage, which players would find easier to track over time.

C) Kitchen

The primary game play underwent a significant redesign in our updated prototypes. First, text prompts were completely removed. Instead, players click and drag ingredients or tools to perform actions. For example, in the first design a player would click a ball of dough and select "Roll Out." In the second, they would click and drag a rolling pin over the dough for the same result. Likewise, the player can press a “fast forward” button on the timer, rather than selecting “Let Sit” or another abstract concept on the food itself. We also opened the kitchen to allow for other views other than the counter, such as the stove and oven (so that players have the capability of burning their foods or themselves, as in real life).

V. Heuristic Evaluation

Finally, we conducted an evaluation of our redesigns utilizing seven heuristics from the "Interactive Heuristic Evaluation Toolkit"[2]. The list of heuristics and our conclusions about them are listed below:

1) Visibility of system status

As a highly interactive video game in which performance is measured primarily by expediency, it is crucial that our design provide immediate feedback for every action taken by the player. The

[2] http://id-book.com/firstedition/catherb/Complete_heurs.php

player manipulates objects by clicking and dragging, and every click is designed to perform an immediate action. However, we cannot fully evaluate our design in light of this heuristic until we have a functional prototype to test for lag.

2) Match between the system and the real world
In our original prototype, players interacted with ingredients or appliances by clicking them and then selecting an action from a pop-up menu. As the participants of the focus group pointed out, this was not intuitive or realistic at all. Since the point of the game is to teach real-world skills, we introduced a completely new system of interaction in the redesign, as described in section IV above. Now the game maps much more closely to the intuitive actions of cooking, and it should help the players transfer what they've learned in the virtual kitchen to a real one.

3) Flexibility and efficiency of use
One of the advantages of a game environment is that it allows players to do whatever they want with no real-world consequences, in order to make mistakes and learn from them. In our design, players can drag anything on screen anywhere they please. They can now burn their food, add nonsensical ingredients, and spend money flagrantly. They can also adjust the ingredients of recipes to accommodate special diets.

4) Aesthetic Design
Though good aesthetics is not an absolute requirement for a fun game, it can enhance the experience and, at the very least, is expected in the modern gaming industry. We have done our best to design a minimalist black-and-white interface with professional-looking graphics. The addition of color and more ornate kitchen decorations would improve this aspect of the game.

5) Help and Documentation
The focus group participants indicated some confusion at the naming conventions of the "titles" players can obtain ("Dishwasher," "Sous Chef," etc.). They also asked for a glossary of cooking terms to help them learn the terminology in real-world recipes, and a beginning tutorial for new players to master the controls. We included two in our redesign: the first as an explanation beside the title on a player's profile and the third as an option on the start screen. The addition of the glossary should be seriously considered in future implementations.

6) Structure of Information
As a very simple game, *Cooking Student* requires a simple structure. The focus group indicated that the hierarchical recipe box was intuitive to use, and the shopping screen is organized by the standard categorizations in grocery stores.

7) Physical Constraints and Extraordinary Users

One primary failing of this game is that it relies on point-and-click, cursor-based game play. Regardless of the platform chosen to implement the game, the controls would require intricate manipulation of a mouse or controller buttons to play. This fails to accommodate players with limited motion. The game also requires a certain level of literacy in English, though we introduced as many representative icons as possible for younger, international, or disadvantaged players.

Discussion and Conclusions

Through this project, we experienced a small part of the design-development cycle for a serious game. We gathered information about our target demographic (college students), produced initial designs, recruited college-aged participants for feedback on these designs, adjusted accordingly, and evaluated the final (yet unfinished) result.

The first hard lesson we learned about the design-development cycle is that it is very difficult to predict what users will want, and even more difficult to find users to *tell* us what they want. Half of our survey respondents came from a captive audience: a required course for computer science students. Our focus group took place three weeks after we had initially scheduled it, due to a lack of interest from potential participants. One of our group members was forced to take advantage of personal connections to students outside of Indiana University, who were compensated with a free vegetarian dinner for their feedback.

The second lesson we learned was that, as smart and talented as we are, without user feedback we would have failed to produce a decent game. Some of the weaknesses of our first designs were, in retrospect, glaringly apparent; it is not intuitive or meaningful at all to click on a pizza pie and select “Bake.” On the other hand, not all of the focus group participants’ suggestions were feasible or necessarily beneficial. Some were enamored with the idea of an interactive forum in which advanced players could own and operate their own “restaurants” with original recipes, which was far beyond the scope of our proposed game.

If we had more time and resources to devote to this project, we would first harvest more information about our key demographic from a wider range. Midwestern Indiana University students may have significantly different skills and eating habits than undergraduates on the West or East coasts, or from different types of schools (private universities, liberal arts colleges, two-year colleges, etc.). Our sample of some fifty students, primarily in technology-related disciplines, may not have been sufficiently representative of even the IU population. Secondly, we would solicit more user feedback. Though the focus group was very useful, it only provided us with the opinions of a small, homogeneous group of potential users. Multiple focus groups would allow us to better generalize our conclusions and evaluations of our designs. Finally, we

would produce a functional prototype for more in-depth user testing. Paper prototypes may be sufficient in the initial design stages, but the way the game actually operates will be the ultimate determinant of its quality.

In conclusion, we believe that this experience with a small, reiterative slice of the user-centered design cycle has confirmed the value of the method for product development. Thanks to preliminary information gathering and sample user involvement, the final product was substantially improved over our initial ideas.

References

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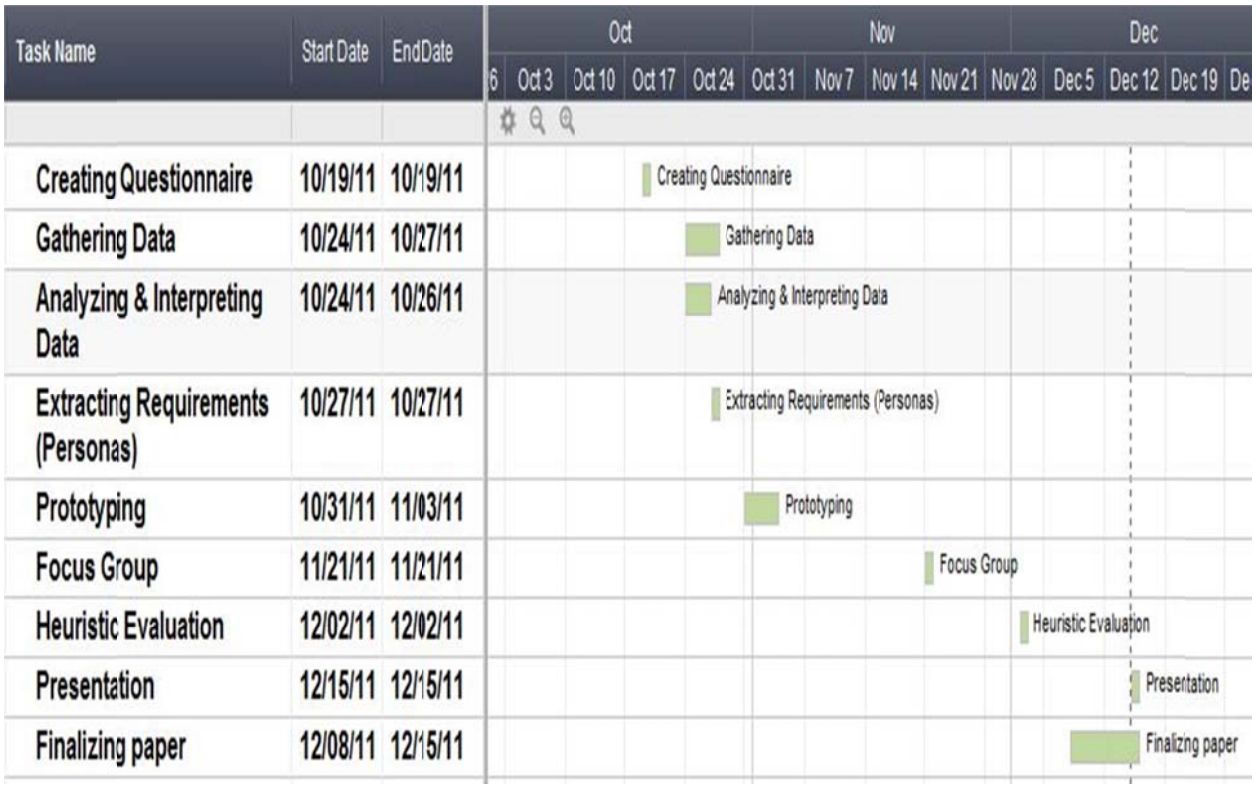
Appendices

Appendix A. Project timelines



Appendix B. Questionnaire

Survey: Cooking and Video Games

We are masters students at the School of Library and Information Science at IU Bloomington. For our class on Human-Computer Interaction, we are designing a video game for college students about cooking and nutrition. This survey will be used in the design of the program. Your answers will be anonymous, and the results will not be published in any way.

1. Your academic status at IU is:
   ___Freshman
   ___Sophomore
   ___Junior
   ___Senior
   ___Super Senior

2. You live:
   ___On campus (campus housing)
   ___Off campus

3. What is your major?

4. How skilled are you at cooking?

   ___Beginner (“I burn water.”)
   ___Intermediate (“I can hold my own in the kitchen.”)
   ___Advanced (“I’m a great cook.”)

5. How often do you cook meals?
   ___Never
   ___Rarely
   ___Several times a month
   ___Several times a week
   ___About everyday

6. What are your favorite meals to cook? (*e.g.* Lasagna, baked potatoes, hamburgers)

7. What are your favorite meals to eat?

8. Which is the most important factor in choosing what to cook? Please rank from 1 (most important) to 4 (least important).

___Taste
___Cost of ingredients
___Nutrition
___Time / Convenience

9. On a scale of 1-5, how interested are you in learning how to cook?

(Not Interested) 1 2 3 4 5 (Very Interested)

10. How often do you play video games?

___Never
___Rarely
___Several times a month
___Several times a week
___About everyday

11. Which platforms do you play on? (*e.g.* PC, Nintendo DS, Wii, XBox, PS3, mobile phone)

Appendix C. Survey Results

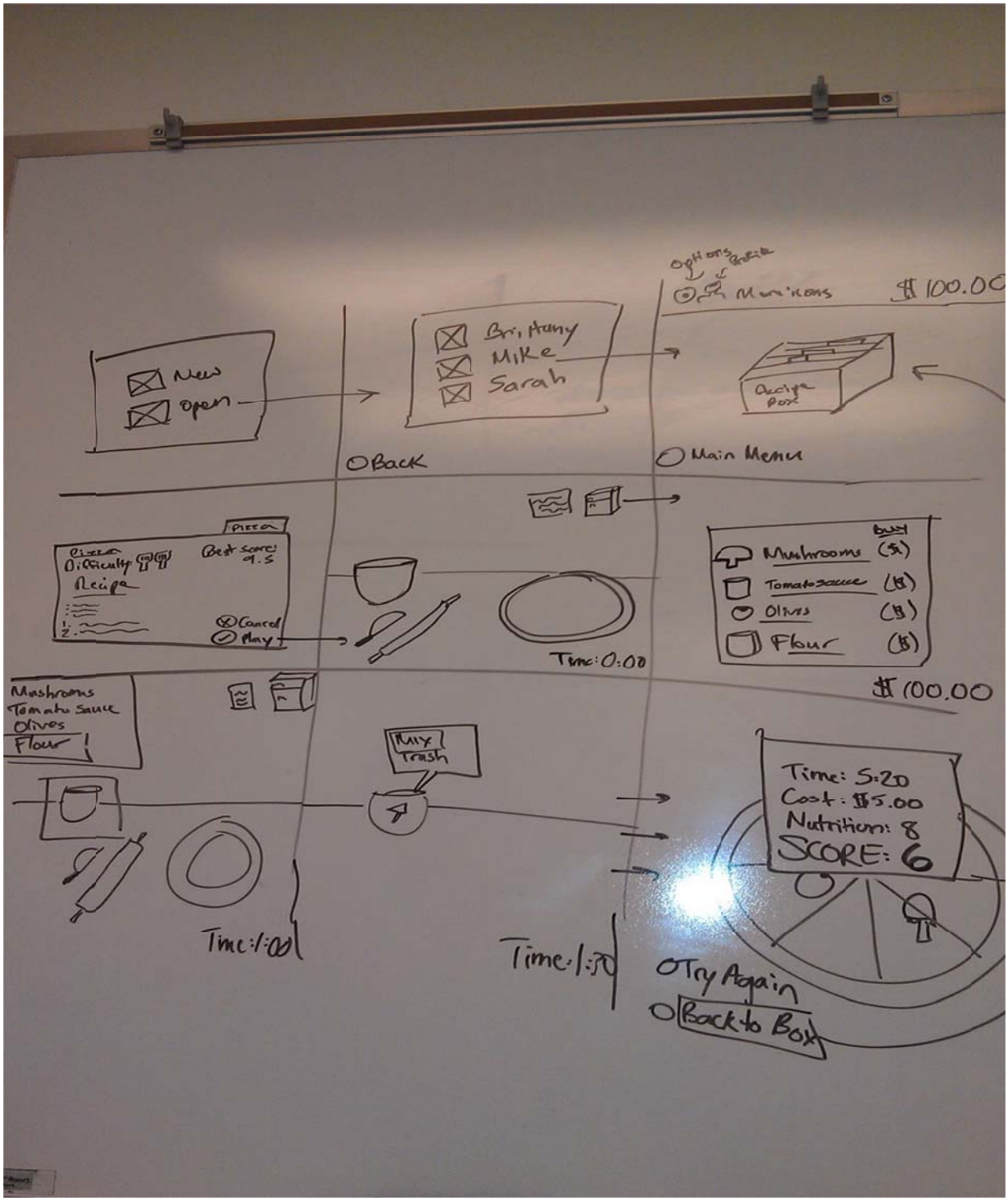
Your academic status at IU is:	You live:	What is your major?	How skilled are you at cooking?	How often do you cook meals?	What are your favorite meals to cook? (e.g. Lasagna, baked potatoes, hamburge	What are your favorite meals to eat?	Which is the most important factor in choosing what to cook? Please rank from 1 (most important) to 4 (least important)	Which is the most important factor in choosing what to cook? Please rank from 1 (most important) to 4 (least important)	Which is the most important factor in choosing what to cook? Please rank from 1 (most important) to 4 (least important)	Which is the most important factor in choosing what to cook? Please rank from 1 (most important) to 4 (least important)	On a scale of 1-5, how intereste are you in learning how to cook?	How often do you play video games?	Which platforms do you play on? (e.g. PC, Nintendo DS, Wii, XBox, PS3, mobile phone)
							Taste	Cost	Nutrition	Time			
Sophomore	Off campus	Comm. & Culture	Intermediate	Several tines a month	Chicken $ veggie mixture	crab	4	1	4	4	5	Rarely	Nintendo DS
Sophomore	Off campus	undecide	Intermediate	About everyday	hamburge eggs	pizza	1	3	4	2	2	About everyday	XBox 360
Junior	Off campus	Computer Science	Advanced	Several tines a week	Fried potatoes, curry	Italian food	2	1	3	4	4	Rarely	PC
Junior	Off campus	Informatic	Intermediate	Several tines a week	baked spaguetti, turkey	Big meals like Thanksgivi	1	4	3	2	3	About everyday	XBox 360
Junior	Off campus	Criminal Justice	Beginner	Several tines a month	burgers, chicken, pasta	steak, sandwiche burgers	2	1	3	4	4	Several tmes a week	XBox 360
Freshman	On campus	Explorato	Beginner	Never	n/a	lasagna, pizza, burgers	4	4	1	4	3	Never	n/a
Freshman	On campus	BioChem	Intermediate	Rarely	spaghetti, stir-fried chicken	spaghetti, steak, chicken	1	4	3	2	2	Several tmes a month	XBox 360
Graduate	Off campus	MLS/MIS	Intermediate	Several tines a month	soups, pasta	pizzas, scups, pasts	4	1	4	1	5	Several tmes a month	PC
Sophomore	Off campus	Business	Intermediate	Rarely	eggs, pasta, chicken, rice	eggs, steak, Italian	1	2	3	4	5	About everyday	XBox 360
Graduate	Off campus	MLS/MIS	Intermediate	Several tines a week	stir-fry, pasta, salad, roasted vegetable tacos	salmon, roasted veggies	4	3	2	1	3	Rarely	Wii, PC
Graduate	Off campus	Informatic Science	Beginner	Several tines a month	eggs, spaghetti	mashed potatoes	1	3	2	4	4	About everyday	PC, XBox
Graduate	Off campus	MLS/MIS	Advanced	About everyday	soup, stir-fries, salads, pasta, roasts	stir-fries	1	3	2	4	4	Rarely	XBox, mobile phone
Graduate	On campus	Informatic Science	Intermediate	Several tines a week	rice	rice	1	3	4	2	4		n/a
Graduate	Off campus	Informatic Science	Intermediate	Several tines a month	pasta, soup, stews	fesengosn	1	1	4	1	4	Never	tablet, PC
Senior	On campus	Acccuntin	Intermediate	Several tines a month	Chinese dishes	mixed, depending on occasions	1	2	3	4	3	Several tmes a month	PC
Junior	On campus	Acccuntin & Finance & Tech Managem	Advanced	Several tines a week	Chinese cuisine	anything spicy	2	4	3	1	4	Several tmes a month	PC, PS3, mobile phone

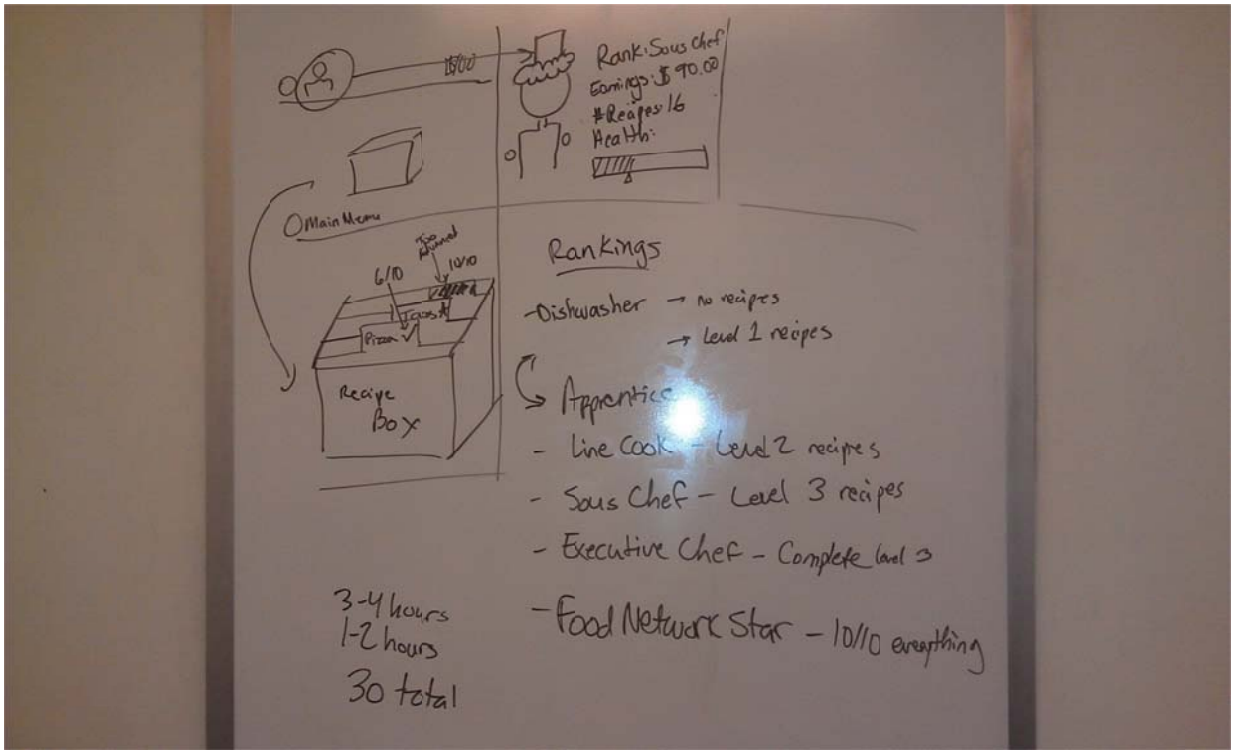
Your academic status at IU is:	You live:	What is your major?	How skilled are you at cooking?	How often do you cook meals?	What are your favorite meals to cook? (e.g. Lasagna, baked potatoes, hamburge	What are your favorite meals to eat?	Which is the most important factor in choosing what to cook? Please rank from 1 (most important) to 4 (least important)	Which is the most important factor in choosing what to cook? Please rank from 1 (most important) to 4 (least important)	Which is the most important factor in choosing what to cook? Please rank from 1 (most important) to 4 (least important)	Which is the most important factor in choosing what to cook? Please rank from 1 (most important) to 4 (least important)	On a scale of 1-5, how interested are you in learning how to cook?	How often do you play video games?	Which platforms do you play on? (e.g. PC, Nintendo DS, Wii, XBox, PS3, mobile phone)
Sophomore	On campus	Business	Beginner	Rarely	chicken	Chinese food	1	4	4	4	5	Never	mobile phone
Junior	On campus	Spanish Educatior	Beginner	Rarely	homemad chicken noodle soup, mashed potatoes	potato soup, steamed brussel sprouts	2	1	4	3	4	Several times a week	XBox 360, Wii, Nintendo 3DS, PC, Nintendo DSi
Senior	Off campus	Mathemat	Intermediate	Several times a month	Quesadilla fish w/ veggies, mac 'n cheese	pasta w/ chicken or shrimp, lasagna, breakfast foods, salads	2	4	3	1	4	Rarely	Nintendo 64, PS2
Junior	On campus	Telecomm	Advanced	Several times a month	Hamburge spaghetti, BBQ chicken	Spaghetti, BBQ, Chinese food, pizza	3	2	4	1	3	Several times a week	PC, DS, Wii, PS3
Senior	Off campus	Computer Science	Intermediate	Several times a week	Noodles, fish, chicken, fried anything	Noodles, fish, chicken, fried anything	2	4	1	3	5	About everyday	Wii, Xbox
Sophomore	On campus	Computer Science	Intermediate	Rarely	Chicken, pizza, mac 'n cheese	Lasagna, pizza, mashed potatoes	2	3	4	1	3	About everyday	Xbox, PS3, mobile
Senior	Off campus	Computer Science	Intermediate	About everyday	Everything	Healthy ones	1	4	2	3	5	Several times a week	Xbox, PS3
Junior	Off campus	Jazz Studies, Computer Science	Intermediate	Several times a month	Pasta	Red meat: burgers, steak, etc.	3	2	4	1	4	Rarely	mobile, Xbox
Sophomore	On campus	Computer Science	Intermediate	Several times a month	Biscuits & Gravy, breakfast foods	Om nom nom anything	1	4	2	2	5	About everyday	PC, Gameboy, Xbox, mobile
Super Senior	Off campus	Computer Science, Telecomm	Advanced	About everyday	Vegetable lo mein, spaghetti	Lo mein, spaghetti, pizza	1	2	3	4	4	Several times a month	PC, mobile, PS3, Xbox
Super Senior	Off campus	Astrophys	Intermediate	About everyday	Pasta dishes, salmon, casserole	Anything homecook and healthy, pizza							
Junior	Off campus	Mathemat Computer Science	Advanced	Several times a week	Risotto, stir fry, steak, pasta	Any/all food, especially sushi	1	2	2	2	5	Several times a week	Xbox 360, Wii, DS, PC
Super Senior	Off campus	Computer Science	Advanced	Several times a week	Casserole pizza, quiche, pate lorcaine	Anything!	3	4	1	2	5	Rarely	DS

Your academic status at IU is:	You live:	What is your major?	How skilled are you at cooking?	How often do you cook meals?	What are your favorite meals to cook? (e.g. Lasagna, baked potatoes, hamburge	What are your favorite meals to eat?	Which is the most important factor in choosing what to cook? Please rank from 1 (most important) to 4 (least important)	Which is the most important factor in choosing what to cook? Please rank from 1 (most important) to 4 (least important)	Which is the most important factor in choosing what to cook? Please rank from 1 (most important) to 4 (least important)	Which is the most important factor in choosing what to cook? Please rank from 1 (most important) to 4 (least important)	On a scale of 1-5, how interested are you in learning how to cook?	How often do you play video games?	Which platforms do you play on? (e.g. PC, Nintendo DS, Wii, XBox, PS3, mobile phone)
Super Senior	Off campus	Computer Science	Intermediate	Several times a month	Rice, pasta, soups	Mediterrai Italian, burgers	1	4	2	3	3.5	Several times a month	PS3, mobile
Junior	On campus	Political Science	Intermediate	Several times a month	Shrimp/pa de Provence (any pasta dish with meat)	Chili, sausage w/ spaghetti, fish w/ anything, ground beef w/ anything, Salisbury steak	1	2	2	2	4	About everyday	PC, PS3, Wii, Gamecub
Sophomore	On campus	Computer Science	Beginner	Never	I don't cook	Cheesebu any pasta, shepherds pie	1	2	4	3	2	About everyday	PC, Xbox
Junior	Off campus	Computer Science, Telecomn	Intermediate	Several times a week	Pork tenderloin chicken stir fry, mac 'n cheese	Steak + baked potato, hamburger grilled chicken breasts	1	2	2	1	5	Several times a month	Nintendo 64, PS1
Senior	Off campus	Computer Science	Beginner	Rarely	Ramen, hot dogs	Hamburge pizza, fried chicken	3	2	4	1	2	About everyday	PC, DS, Wii, PS3
Junior	Off campus	Telecomn	Advanced	Several times a week	Baked Potatoes	Kebabs, Halal food	2	1	2	1	2	Several times a month	PC, PS3
Junior	Off campus	Computer Science	Intermediate	Several times a week	Chicken sandwich, burgers, spaghetti	Buffalo chicken wings	1	3	4	2	3	Rarely	PC, Wii, PS3
Junior	Off campus	Computer Science	Advanced	Several times a week	Cuban fried pork chops	Steak and potatoes	1	3	4	2	5	About everyday	PC, Xbox, PS3, mobile
Junior	Off campus	Computer Science	Intermediate	Several times a week	Chinese	Chinese	1	2	2	2	5	Several times a month	PS3, PC, mobile
Senior	Off campus	Statistics	Beginner	Rarely	Sandwich	Pizza	1	2	2	2	3	Rarely	PC
Sophomore	Off campus	Computer Science	Beginner	Several times a week	Spaghetti, soup, chicken nuggets	Burgers, lasagna, spaghetti, salad	2	4	3	1	4	Several times a week	Mac OSX, iOS
Junior	Off campus	Computer Science	Intermediate	Several times a month	Pastas, grilling, various crock pot things	Same as what I like to cook	4	3	1	2	5	Several times a month	PC, Xbox, Nintendo 64, Sega
Junior	On campus	Computer Science	Intermediate	Rarely	Pasta	Ribs, steak, hamburger pasta	1	2	4	3	2	About everyday	Xbox, PC, mobile

Your academic status at IU is:	You live:	What is your major?	How skilled are you at cooking?	How often do you cook meals?	What are your favorite meals to cook? (e.g. Lasagna, baked potatoes, hamburge	What are your favorite meals to eat?	Which is the most important factor in choosing what to cook? Please rank from 1 (most important) to 4 (least important)	Which is the most important factor in choosing what to cook? Please rank from 1 (most important) to 4 (least important)	Which is the most important factor in choosing what to cook? Please rank from 1 (most important) to 4 (least important)	Which is the most important factor in choosing what to cook? Please rank from 1 (most important) to 4 (least important)	On a scale of 1-5, how interested are you in learning how to cook?	How often do you play video games?	Which platforms do you play on? (e.g. PC, Nintendo DS, Wii, XBox, PS3, mobile phone)
Sophomore	On campus	Business	Intermediate	Several tines a month	Cheesebu hot dogs, ramen	Pasta, pizza, burgers	3	2	4	1	4	Several tmes a week	Xbox 360, PC
Junior	On campus	Computer Science	Intermediate	Rarely	Pastas and tacos	Anything and everything	1	4	2	3	3.5	Several tmes a month	PC, Mac, N64
Junior	Off campus	Computer Science	Beginner	Rarely	Ramen	Real food (i.e. not ramen)	2	2	2	1	3.5	About everyday	PC, Xbox, PS3, mobile, Wii
Junior	Off campus	Informatic	Intermediate	Several tines a month	Spaghetti, mac 'n cheese	PASTA, Mexican	1	4	3	2	4	Several tmes a month	Wii, PC, mobile
Junior	Off campus	Computer Science	Intermediate	Several tines a week	Parmesan Chicken and Rice	Ravioli	1	2	4	3	5	About everyday	PC, Xbox
Sophomore	On campus	Computer Science	Intermediate	Several tines a month	Pasta, pizza, steaks	Pasta, pizza, steaks	1	2	4	3	3	Several tmes a week	Xbox
Junior	Off campus	Computer Science	Beginner	Never	Hamburge	Pizza, Wings	1	2	2	2	4	Several tmes a week	PC, mobile, Xbox, PS3, N64
Sophomore	On campus	Computer Science	Beginner	Never	I don't cook	Pasta	2	3	4	1	3	Several tmes a week	PC, PS3, Mac
Sophomore	Off campus	Computer Science	Beginner	Several tines a week	Tacos & pasta	Tacos & pasta	2	1	4	3	3	About everyday	PC
Senior	Off campus	Computer Science	Intermediate	Several tines a week	Mabo tofu	Beer, edamame	1	4	3	2	4	Rarely	PC

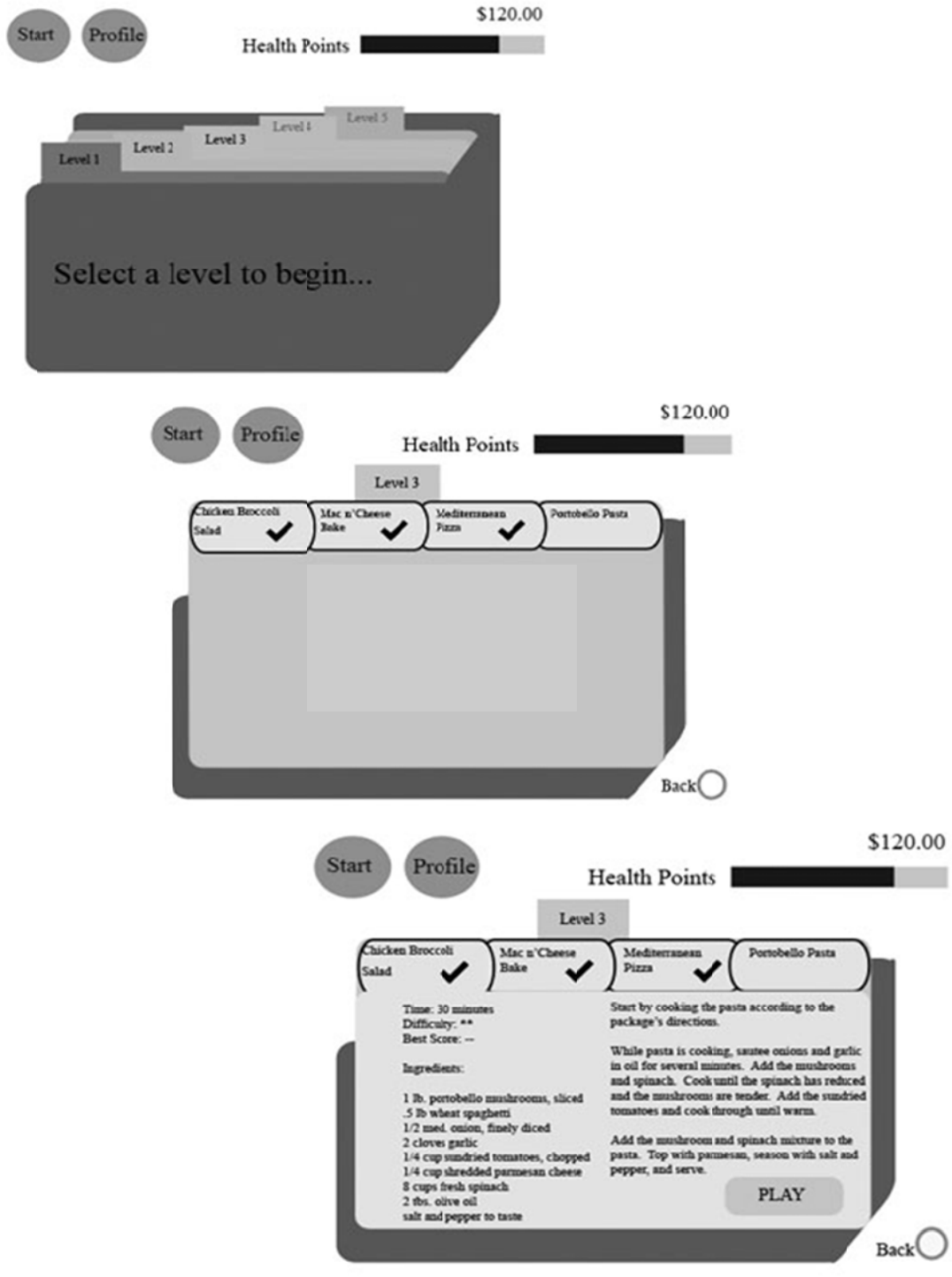
Appendix D. Design Sketches



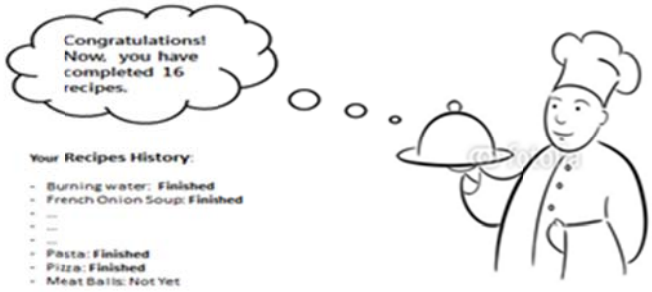

Rank: Sous Chef
Earnings: $ 90.00
#Recipes: 16
Health:
Main Menu
6/10
10/10
Recipe Box
Rankings
-Dishwasher → no recipes
→ Level 1 recipes
Apprentice
- Line Cook - Level 2 recipes
- Sous Chef - Level 3 recipes
- Executive Chef - Complete level 3
- Food Network Star - 10/10 everything
3-4 hours
1-2 hours
30 total

Appendix E. Initial Prototypes

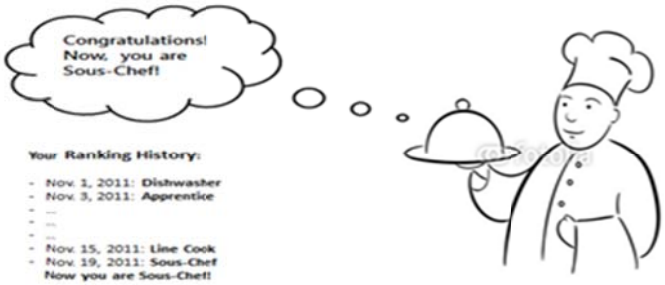
1. Recipe box

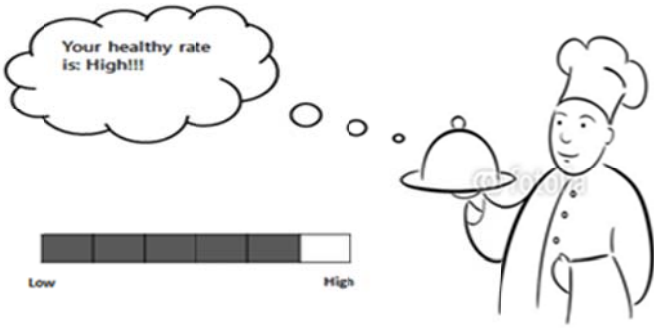


2. Profile

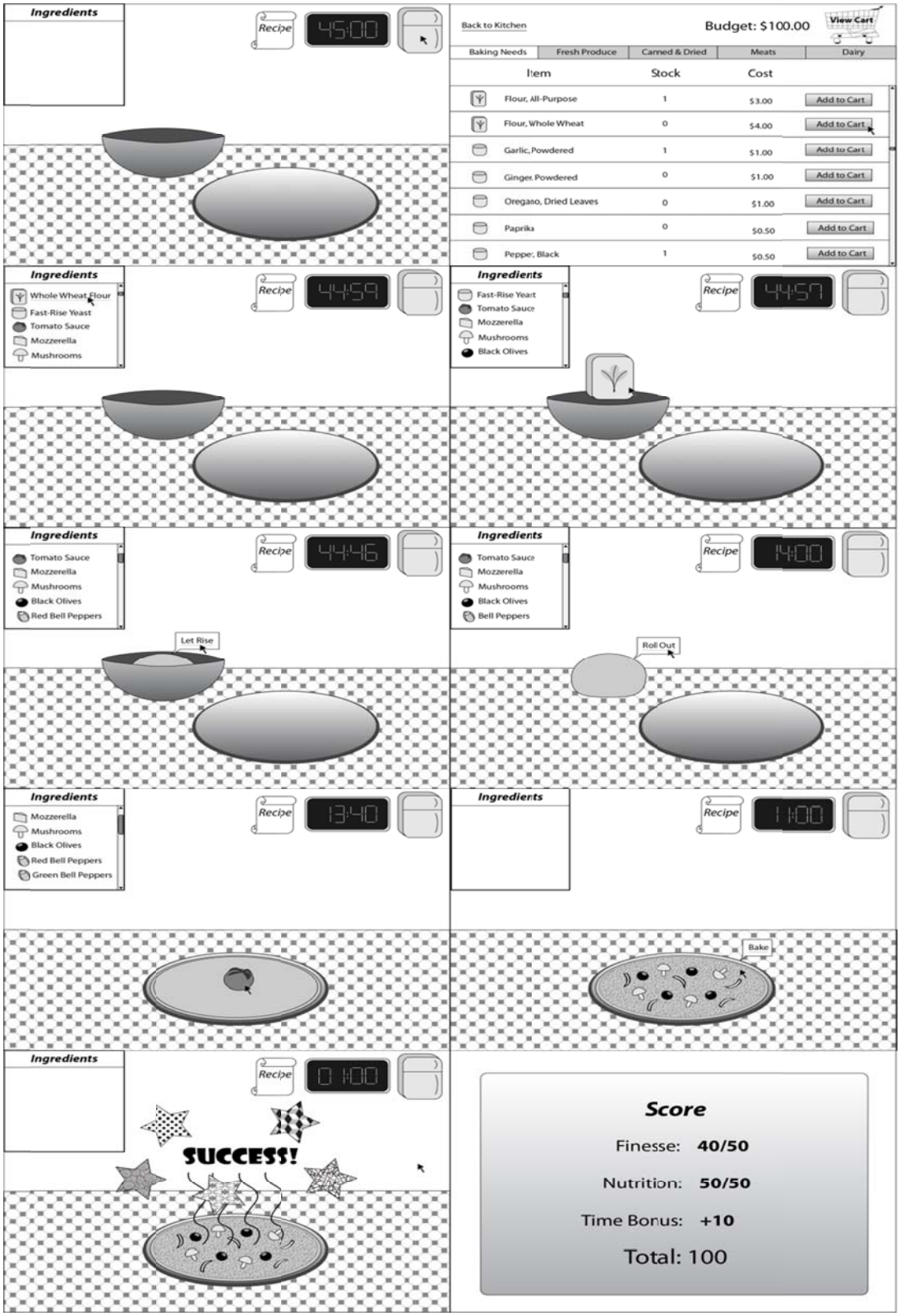

Congratulations! Now, you have completed 16 recipes.
Your Recipes History:
- Burning water: Finished
- French Onion Soup: Finished
- ...
- ...
- ...
- Pasta: Finished
- Pizza: Finished
- Meat Balls: Not Yet


Congratulations! Now, you have earned $90.
Your Earning History:
- Nov. 1, 2011: $10
- Nov. 3, 2011: $8
- ...
- ...
- ...
- Nov. 15, 2011: $10
- Nov. 19, 2011: $8
Total: $90


Congratulations! Now, you are Sous-Chef!
Your Ranking History:
- Nov. 1, 2011: Dishwasher
- Nov. 3, 2011: Apprentice
- ...
- ...
- ...
- Nov. 15, 2011: Line Cook
- Nov. 19, 2011: Sous-Chef
Now you are Sous-Chef!


Your healthy rate is: High!!!
Low
High

3. Kitchen


Ingredients
Recipe
45:00
Back to Kitchen
Budget: $100.00
View Cart
Baking Needs
Fresh Produce
Canned & Dried
Meats
Dairy
Item
Stock
Cost
Flour, All-Purpose
1
$3.00
Add to Cart
Flour, Whole Wheat
0
$4.00
Add to Cart
Garlic, Powdered
1
$1.00
Add to Cart
Ginger, Powdered
0
$1.00
Add to Cart
Oregano, Dried Leaves
0
$1.00
Add to Cart
Paprika
0
$0.50
Add to Cart
Pepper, Black
1
$0.50
Add to Cart
Whole Wheat Flour
Fast-Rise Yeast
Tomato Sauce
Mozzerella
Mushrooms
44:59
Black Olives
44:57
Red Bell Peppers
44:46
Let Rise
14:00
Roll Out
Green Bell Peppers
13:40
1:00
Bake
01:00
SUCCESS!
Score
Finesse: 40/50
Nutrition: 50/50
Time Bonus: +10
Total: 100

Appendix F. Focus Group questions

Focus Group Questions

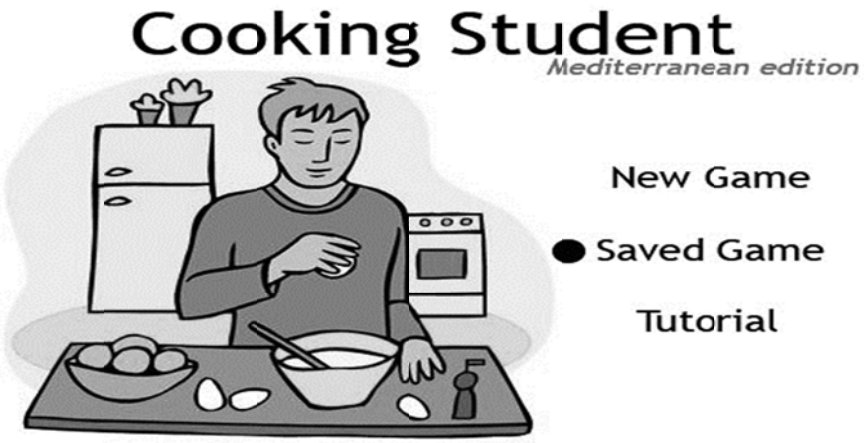
1. Please introduce yourself:

   Year in school
   Where you live
   What you're studying

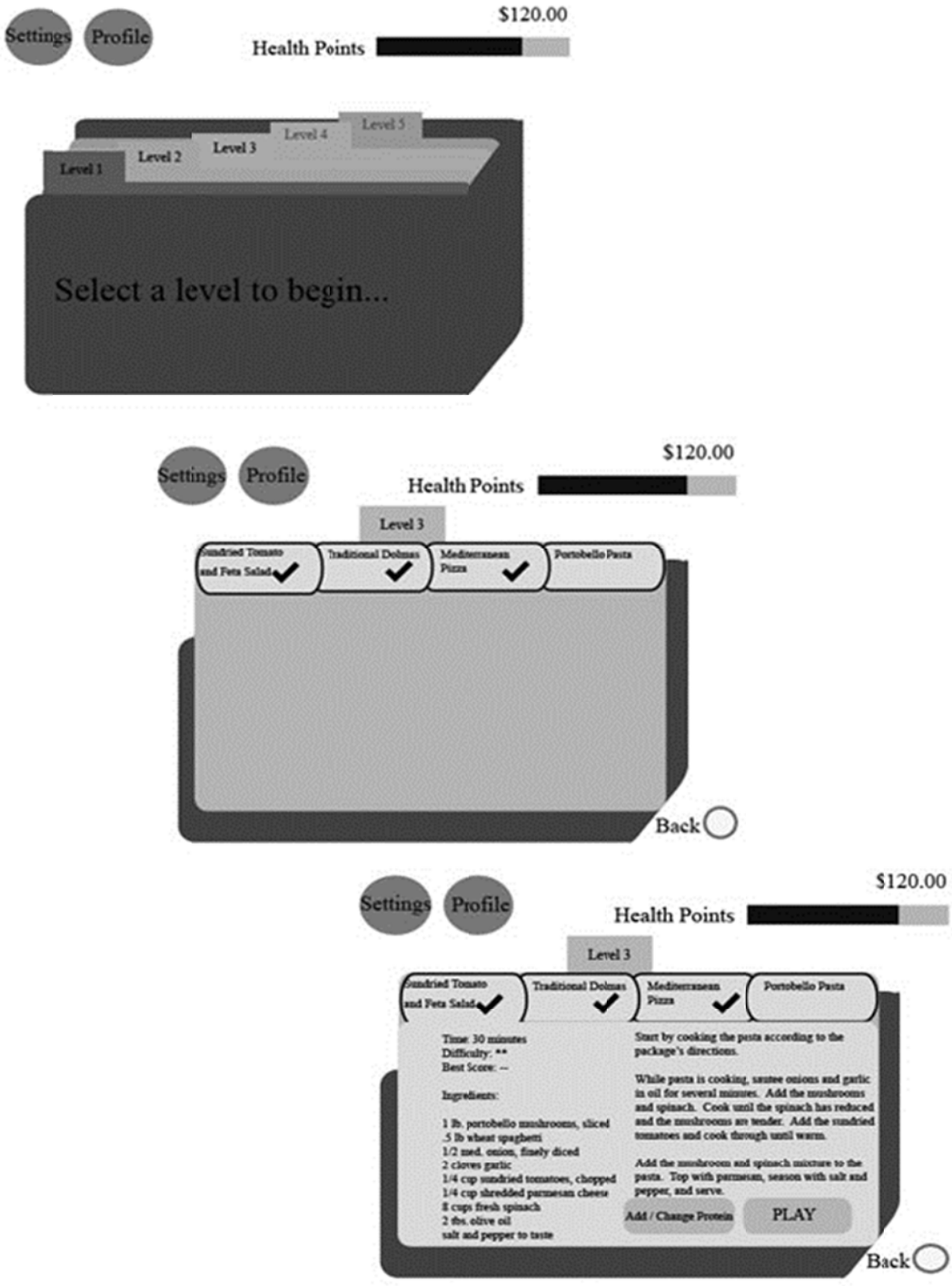
2. Can you talk about your cooking and eating habits when you're at school?
   a. How often you cook
   b. What you cook
   c. Difference between what you cook and what you like to eat
   d. What factors into what you decide to cook?
   e. How healthy are your eating habits? Why?
   f. How good are you at cooking? Do you have an interest in learning more about cooking?
3. Videogames
   a. What platforms do you use?
   b. What kind of games do you like?
   c. What makes you like a video game?
   d. Have you ever played a game centered around cooking i.e. Cooking Mama?
4. Prototype Playthrough
   a. Does the narrative of the game make sense? How to cook recipes, ratings, point system
   b. What do you think of the navigation?
   c. What do you think of the recipe box concept? Would you use recipes from the game in real life?
   d. Do you think you could learn real skills from this game?
   e. Would this be a convenient way to learn cooking? Easy?
   f. What are some improvements we could make to the game design?

Appendix G. Updated Prototypes

1. Home

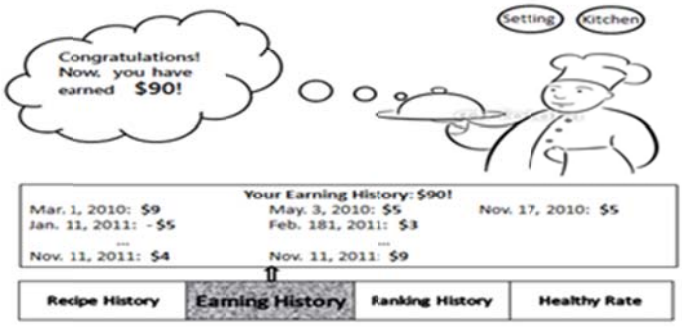


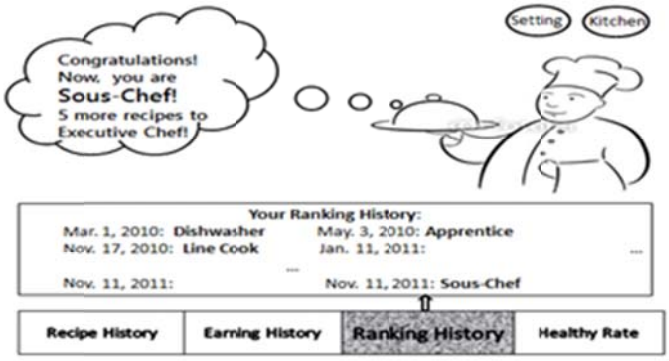
2. Recipe Box


Settings
Profile
$120.00
Health Points
Level 1
Level 2
Level 3
Level 4
Level 5
Select a level to begin...
Settings
Profile
$120.00
Health Points
Level 3
Sundried Tomato and Feta Salad
Traditional Dolmas
Mediterranean Pizza
Portobello Pasta
Back
Settings
Profile
$120.00
Health Points
Level 3
Sundried Tomato and Feta Salad
Traditional Dolmas
Mediterranean Pizza
Portobello Pasta
Time: 30 minutes
Difficulty: **
Best Score: --
Ingredients:
1 lb. portobello mushrooms, sliced
.5 lb wheat spaghetti
1/2 med. onion, finely diced
2 cloves garlic
1/4 cup sundried tomatoes, chopped
1/4 cup shredded parmesan cheese
8 cups fresh spinach
2 tbs. olive oil
salt and pepper to taste
Start by cooking the pasta according to the package's directions.
While pasta is cooking, sautee onions and garlic in oil for several minutes. Add the mushrooms and spinach. Cook until the spinach has reduced and the mushrooms are tender. Add the sundried tomatoes and cook through until warm.
Add the mushroom and spinach mixture to the pasta. Top with parmesan, season with salt and pepper, and serve.
Add / Change Protein
PLAY
Back

3. Profile

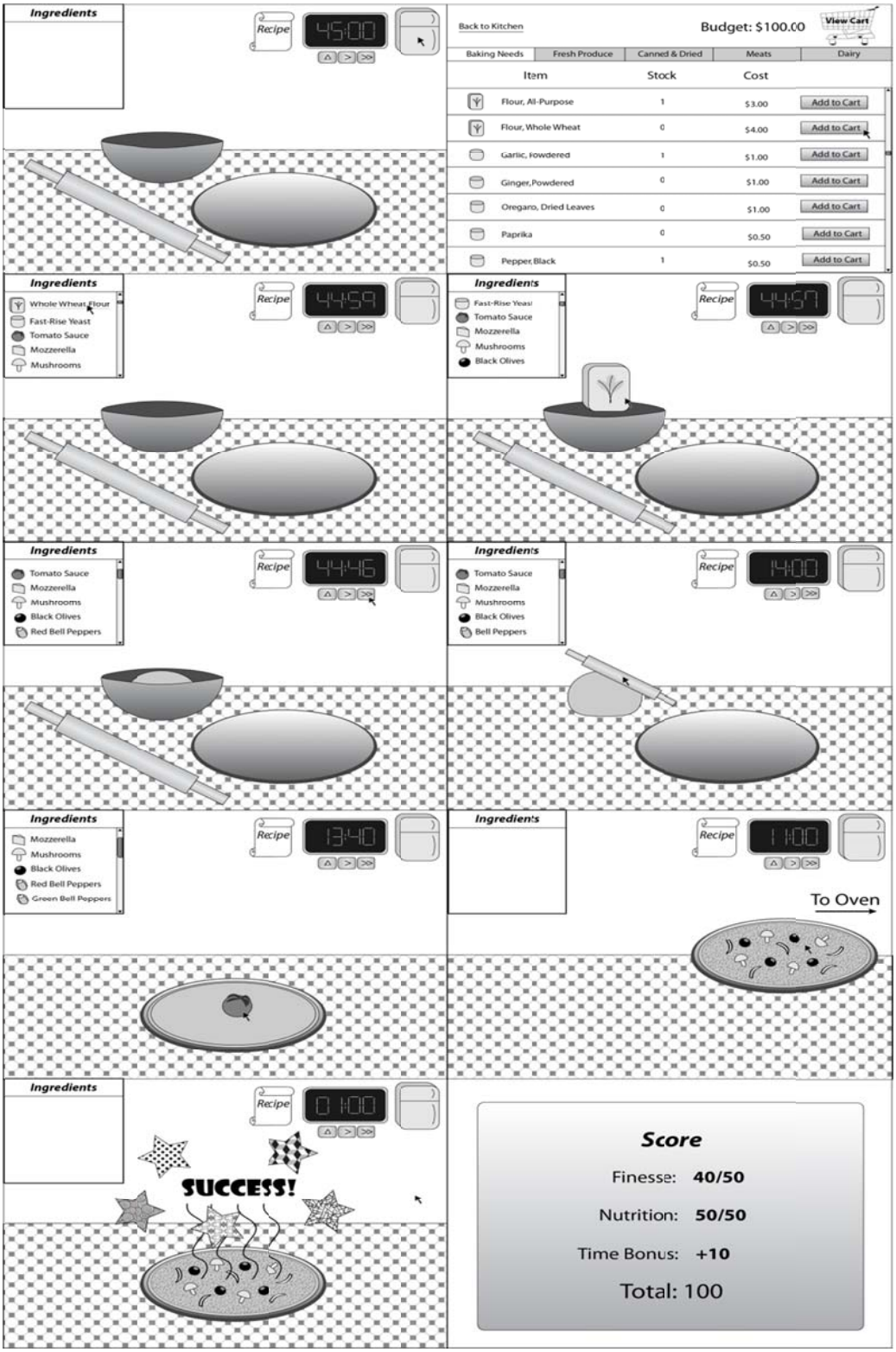

Setting
Kitchen
Congratulations! Now, you have completed 16 recipes!
Your Recipes History: 16 recipes!
Burning water: Completed
French Onion Soup: Completed
Pasta: Completed
Pizza: Completed
...
...
Meat Balls: In Progress
Stir Fries: Planning
Recipe History
Earning History
Ranking History
Healthy Rate


Setting
Kitchen
Congratulations! Now, you have earned $90!
Your Earning History: $90!
Mar. 1, 2010: $9
May. 3, 2010: $5
Nov. 17, 2010: $5
Jan. 11, 2011: -$5
Feb. 181, 2011: $3
...
...
Nov. 11, 2011: $4
Nov. 11, 2011: $9
Recipe History
Earning History
Ranking History
Healthy Rate


Setting
Kitchen
Congratulations! Now, you are Sous-Chef! 5 more recipes to Executive Chef!
Your Ranking History:
Mar. 1, 2010: Dishwasher
May. 3, 2010: Apprentice
Nov. 17, 2010: Line Cook
Jan. 11, 2011:
...
...
Nov. 11, 2011:
Nov. 11, 2011: Sous-Chef
Recipe History
Earning History
Ranking History
Healthy Rate


Setting
Kitchen
Congratulations! Now, your healthy rate is 88% (very high) !
Your Healthy Rate History:
Mar. 1, 2010: 50%
May. 3, 2010: 68%
Nov. 17, 2010: 72%
Jan. 11, 2011: 82%
...
...
Nov. 11, 2011: 68%
Nov. 11, 2011: 88%
Recipe History
Earning History
Ranking History
Healthy Rate

4. Kitchen


Ingredients
Recipe
45:00
Back to Kitchen
Budget: $100.00
View Cart
Baking Needs
Fresh Produce
Canned & Dried
Meats
Dairy
Item
Stock
Cost
Flour, All-Purpose
1
$3.00
Add to Cart
Flour, Whole Wheat
0
$4.00
Add to Cart
Garlic, Powdered
1
$1.00
Add to Cart
Ginger, Powdered
0
$1.00
Add to Cart
Oregano, Dried Leaves
0
$1.00
Add to Cart
Paprika
0
$0.50
Add to Cart
Pepper, Black
1
$0.50
Add to Cart
Ingredients
Whole Wheat Flour
Fast-Rise Yeast
Tomato Sauce
Mozzerella
Mushrooms
Recipe
44:59
Ingredients
Fast-Rise Yeast
Tomato Sauce
Mozzerella
Mushrooms
Black Olives
Recipe
44:57
Ingredients
Tomato Sauce
Mozzerella
Mushrooms
Black Olives
Red Bell Peppers
Recipe
44:46
Ingredients
Tomato Sauce
Mozzerella
Mushrooms
Black Olives
Bell Peppers
Recipe
14:00
Ingredients
Mozzerella
Mushrooms
Black Olives
Red Bell Peppers
Green Bell Peppers
Recipe
13:40
Ingredients
Recipe
11:00
To Oven
Ingredients
Recipe
01:00
SUCCESS!
Score
Finesse: 40/50
Nutrition: 50/50
Time Bonus: +10
Total: 100