

## Learn Diabetes Meal Planning Skills in a Virtual World

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### Abstract

**Introduction:** An estimated 25.8 million Americans or 8.3% of the population have diabetes and the incidence of diabetes is increasing most rapidly in children and young adults. Diabetes management includes following a diabetes meal plan, being physically active and possibly taking medications. There is limited diabetes education programs designed for young adults and the virtual world, was used to design a novel diabetes meal planning program that targeted their limited meal preparation skills and their social environment.

**Objectives:** 1. To develop two virtual world simulations-kitchen equipment and recipe preparation- that would provide individuals with skills they need to prepare meals for dining in at home. 2. To develop two virtual world simulations, in a restaurant and buffet, this teaches them how to choose foods that fit into their meal plan when dining out.

**Methods:** Data was collected from young adults (18-28 years-old) with type 1 and type 2 diabetes who attended focus groups (n=22) and health care providers in one-on-one interviews (N=5) on the barriers they experienced to following their diabetes meal plan. The four virtual world simulations addressed these barriers.

**Results:** Focus group and interview results indicate that these individuals were food illiterate – they didn't have the skills to plan and cook healthy meals. In addition, eating out with friends is an important part of their social life. To help these young adults acquire these crucial meal skills and not have to eliminate their social life, four virtual world settings-kitchen equipment, recipe preparation, restaurant, and buffet-were designed where they could practice diabetes meal planning and recipe preparation.

**Conclusion:** This project focused on designing virtual world simulations to help young adults (18-28 year-olds), meet their diabetes meal plan recommendations.

**Keywords:** Diabetes; Young adults; Virtual

### Introduction

According to the 2011 National Diabetes Fact Sheet, a total of 25.8 million children and adults in the United States have diabetes [1], and 23% of adolescents have pre-diabetes or diabetes [2]. Unfortunately, the incidence of diabetes is increasing most rapidly in children and young adults. The Centers for Disease Control and Prevention (CDC) estimates that 3.7% of 20-44 year-olds have diabetes and most of these cases are type 2 diabetes [3]. Due to the challenges of transitioning from adolescence to young adulthood, this age group has a heightened need for diabetes services and support. Providing age appropriate behavioral recommendations is necessary for improving glycemic control, quality of life, and avoiding long term complications [4].

Young adults have additional challenges to manage the disease because they also are seeking to assert their independence while dealing with issues such as finances, establishing relationships, exploring career options, and transitioning their healthcare from pediatric care to adult care [5]. These challenges make it difficult for young adults to find the proper support they need to manage their condition [6].

A variety of educational models exist, but new trends toward virtual technology education programs are beginning to occur. Professionals in both the fields of diabetes and technology recommend using virtual worlds for diabetes management training [7], for weight loss [8], and to encourage people to make healthier food options [7]. The Second Life® virtual world is the largest virtual landscape [9] and may be an effective means of conducting medical education [10]. The Second Life® world provides an opportunity for participants to interact with each other and diabetes educators using avatars. As online and virtual education

modalities increase in prevalence, educators need to better understand their efficacy [11] and impact on young adults with diabetes.

### Methods

Focus groups and one-on-one interviews were conducted to inform the content and structure of a virtual diabetes world that provides support for those with diabetes. Three focus groups were conducted (n=22) with young adults diagnosed with type 1 or type 2 diabetes, ages 18-28. The interviews were conducted with 5 health care providers; one had diabetes and was in the 18-28 year old age group. The focus groups and interviews asked two main questions: 1) what components should be included in a virtual world diabetes meal planning setting and 2) suggestions for overcoming common barriers to diabetes meal management.

An interdisciplinary team of virtual world builders, health care providers and designers met regularly to design a setting that was appealing, interactive and included built in incentives and rewards. The last step in the development process is to have the virtual world tested and evaluated by young adults with diabetes.

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## Results

Participants stated that they did not have meal preparation skills and were often unaware about what foods to select that would fit into their meal plan when dining out. They also requested information on carbohydrate counting and easy and healthy recipes.

A virtual world called “Diabetes Life” was developed in 2013 and it contains four simulations contained in two interactive meal planning areas. Each interactive area uses the Healthy Diabetes Plate (Figure 1) meal planning tool. The two areas are as follows:

1. The *Dining Out* area has two simulations, a restaurant called Café Rill (Figure 2) and a buffet. In the virtual restaurant, participants select foods from a menu (Figure 3) and receive feedback on



Figure 4: Dining Out-- Buffet.

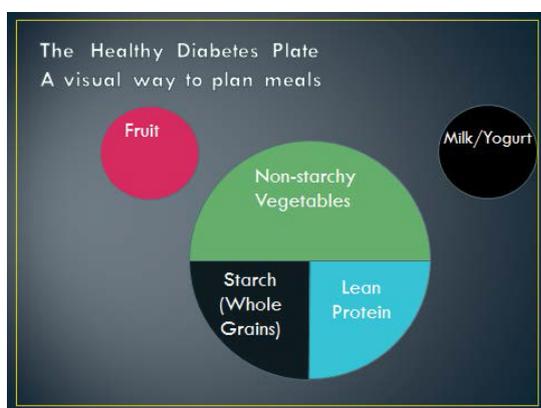


Figure 1: Healthy Diabetes Plate.



Figure 5: Dining In--Kitchen Equipment.



Figure 2: Dining Out--Café.



Figure 6: Dining In--Recipes.



Figure 3: Dining Out-- Café Menu.

whether their selections did or did not meet their diabetes meal plan and Healthy Diabetes Plate recommendations. In the virtual Buffet (Figure 4), participants select from a variety of food items and learn how to correctly select food items that fit their meal plan and the Healthy Diabetes Plate.

2. The *Dining In* area has two simulations, an interactive component that teaches them about kitchen equipment (Figure 5) and cooking skills (e.g. how to use a knife) and a recipe kitchen. Participants first learn about kitchen equipment and use this information when they go to the recipe kitchen (Figure 6) and prepare a recipe. Participants gather all of the ingredients in a recipe from the virtual kitchen (pantry, cupboard, and

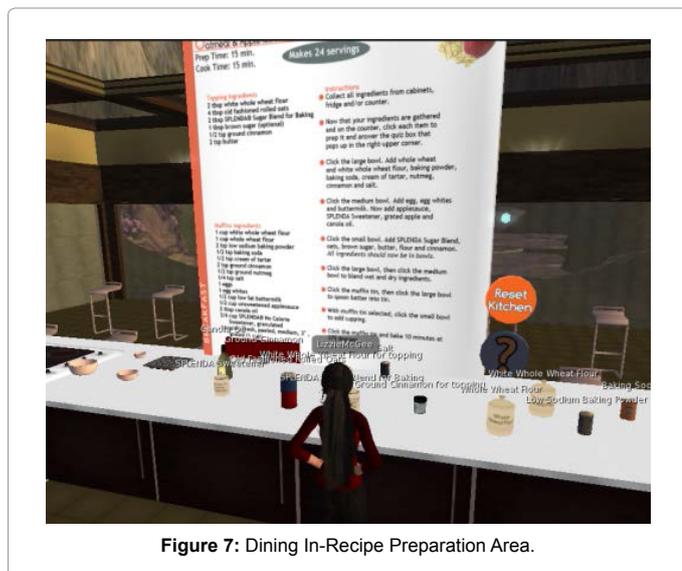


Figure 7: Dining In-Recipe Preparation Area.

refrigerator) and follow the step by step instructions for the recipe. Once the recipe is completed, they learn where the recipe fits in their diabetes meal plan (Figure 7).

## Discussion

This paper reports on how the results of formative research with young adults with type 1 or type 2 diabetes was used to create a virtual world that promotes healthful eating and diabetes management that this age group would find appealing. Their recommendations were used to guide decisions about the on-line virtual world content, structure and design. As such, it provides guidance on how to involve target audiences in the development of future virtual or on-line behavior change and diabetes management programs. The Healthy Diabetes Plate

is designed to promote healthy eating and to teach meal planning skills when dining in or dining out and meets education recommendations for diabetes management.

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