The Lilypad System

A Data Collection Tool to Support the Care of Individuals with Chronic Conditions

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ABSTRACT

Providing care for chronic conditions involves complex coordination. Integrated care is required, involving collaboration and synchronization among different kinds of care providers, such as physicians, psychologists, and paraprofessionals. The challenges of integrated care require innovation in health information technologies (HIT). In this demo, we present the *Lilypad* system, a novel HIT designed to support behavioral data management through a data collection application, a web admin panel, and care receiver modules.

CCS CONCEPTS

• **Human-centered computing** → *User-centered design*; • **Applied computing** → **Health care information systems**; Health informatics;

KEYWORDS

Health Information Technology, chronic conditions, data collection tools, integrated care

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1 INTRODUCTION

Chronic conditions involve long-term care that requires coordination which has differing complexities from the care required for acute illness or injury. Care is provided by teams often distributed across agencies, rather than by a single physician. Thus, integrating care that spans time, providers, and agencies is a unique challenge in supporting healthcare services. The design of health information technologies (HIT) must meet this challenge by addressing the needs of care teams within an integrated model of care. However, HIT often fails to enhance collaboration and communication [2]. Novel HIT are needed to allow care teams share data for monitoring progress and continuously improving care based on systematic assessment of what is and is not working [1]. For the integration of HIT to be successful, they need to blend seamlessly into existing practices and promote collaborative reflection among care team members [3].

We present a novel HIT system, *Lilypad*, which supports integrated care of individuals with chronic conditions. The *Lilypad* system has been deployed in a behavioral health, thus we describe its components within this context.

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2 SYSTEM DESCRIPTION

Lilypad consists of three components: a tablet application that supports data collection activities; a website that supports customization of data collection as well as supervisory-level statistics; and two care receiver modules that allow for review and reflection on the data that has been collected.

Data Collection Application

The main component of the *Lilypad* system is a tablet application (Figure 1a), which is used by care providers to enhance data collection methods in four different ways. (1) Care providers record data in *real-time* on individual care receivers using customized behavior categories. Each care team member uses their own tablet to access a care receiver's profile with real-time data. Thus, data collection can occur collaboratively and enable all members of the care team to review up-to-the-minute data. (2) Data collected across care team members is time-stamped and stored following the same format, to promote *consistency.*. (3) Care team members can record *details* about their care receivers through voice notes or text for every piece of quantitative data logged. (4) Care providers can reflect on data in real-time using the 'analyze' tab. This allows in-situ data monitoring in line-graph format, including date range selection to quickly compare data over a period of time (Figure 1b).

Administration Panel for Customization

Dragonfly is the administration panel available in website form as part of the *Lilypad* system. *Dragonfly* is primarily used by care providers (e.g., from a supervisor level) and it allows the care team to customize the *Lilypad* system on

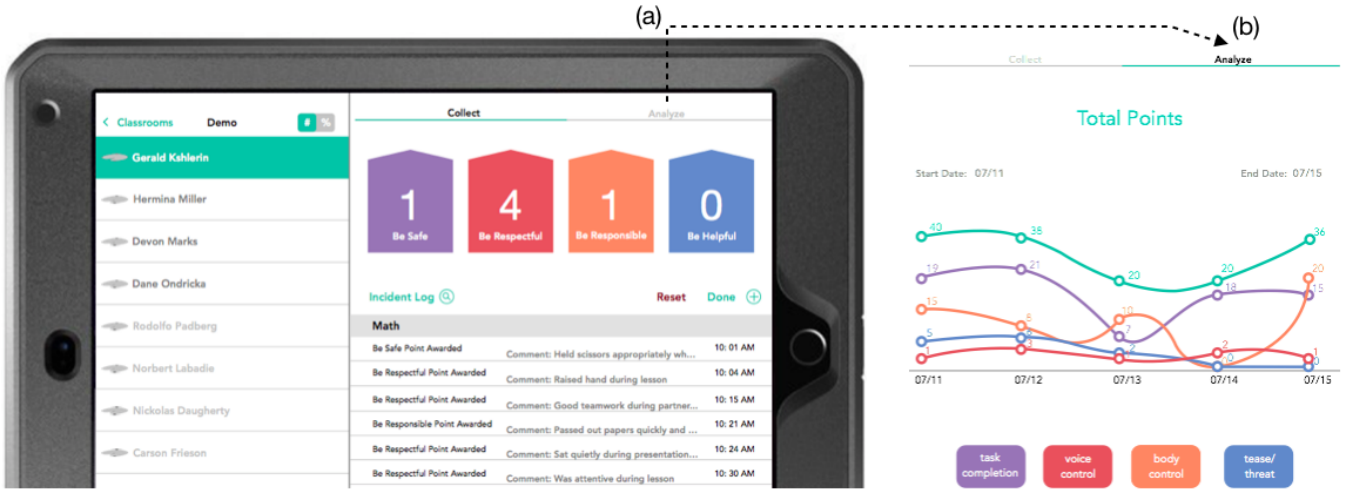

Figure 1: The *Lilypad* system's tablet application: (a) customizable behavior counters and incident log where points, times, and comments get logged (b) analyze tab showing a daily view of points.

an individual or group (e.g. classroom, care receivers, etc.) basis. *Dragonfly* provides the care team with a more in-depth explanation of the care receivers' data and allows them to decide which information they want to share with internal care team members (e.g., different care provider roles such as behavior analysists or social workers) and with external care team members (e.g., care receivers' parents or tutors). Historical data of each care receiver are kept in a cloud-based server and can be accessed through *Dragonfly* for a more in-depth data analysis. *Dragonfly* automatically generates codes for recipients, behaviors, and time stamps all entries. A search tool helps care team members to easily access specific care receiver information. *Dragonfly* allows care providers to tailor which information they want to share with care receivers.

Modules for Care Receiver Reflection

The care receiver modules of the *Lilypad* system are designed for care receivers as the primary users, providing options for them to reflect on and collect their behavioral data. The *Lilypad* system has two care receivers modules: (1) a wall-mounted display to allow care receivers (e.g., students) to keep track of their behavioral data (mostly positive points earned) in real-time; (2) A smartwatch application to promote care receiver's self-management of their behaviors, by having them collect their own data in individualized categories at the same time as the care team, who are using the tablet. This was created to help students with the transition from special to regular education.

3 USER SCENARIO

We illustrate use of the *Lilypad* system with a usage scenario based on empirical data. Miss Kim teaches a special education classroom comprised of 12 students ranging from third to fifth grade who have varying behavioral health needs. During an activity, Miss Kim hears Frankie making fun of another student's reading skills. Miss Kim opens *Lilypad* on her tablet, and uses Frankie's unique frequency counter for teasing to log a new point. At the next care team meeting, Miss Kim logs into *Dragonfly*, to reference Frankie's data. During the discussion, she filters the data to only show points logged under the 'teasing' counter, and then generates a graph for the group to review together. Another one of Miss Kim's students, Jill, is using the Smartwatch module of the *Lilypad* system to help her reflect on her behaviors. Jill is increasing her independents by logging her own behavioral points on the Smartwatch, while Miss Kim logs points in the same categories on her tablet. At the end of each period, the Lilypad system helps Jill compare her responses to Miss Kim's, with the goal of increasing Jill's self-monitoring skills by producing the same responses as Miss Kim.

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