



Lilypad

Improving information sharing and interpretation among care teams

Kenneth B. Nimley

Gabriela Marcu

Allison Spiller



Introduction

Behavioral intervention for children with autism and other special needs requires specialists to record and monitor behavioral data. Monitoring this data over time can be difficult because it is often not collected accurately or easy to interpret. To address this problem, we have designed and validated the Lilypad system. The design of Lilypad was based on three key barriers to the use of data: record keepers need support for capturing representative data, decision makers need access to informative data, and data needs to complement intuition and face-to-face communication. The Lilypad system supports recording of behavioral data in the moment, and analysis of data to identify trends over time. Lilypad is a collaborative system designed to improve communication among intervention teams (behavioral specialists, aides, psychiatrists, educators, administrators, parents, and children themselves). We are conducting field studies with Lilypad in special education settings to evaluate its impact on coordination and decision-making.

Methods

This deployment study focused on a behavior disorder program within an elementary school in a rural area, which had previously participated in the design and development of Lilypad. The program is comprised of seven staff members in total and broken down into 3 classrooms. Each classroom has between 12-15 students, with 3 program staff assigned to each room and one staff supervisor overseeing activities.

Each participant was giving a Lilypad enabled tablet device to monitor and collect student behavior data. By conducting weekly classroom observations to monitor device functionality and staff behaviors, we were able to document their interactions with the device and how they integrated the tool into their daily activities. We also logged discussions and commentary surrounding their thoughts on usage and efficiency of the system.

Lilypad System

We have developed a system to support collaborative reflection through a network of Pads used by members of a colocated team. We named this system Lilypad to convey the notion of independent points of interaction with data that also belong to an interconnected ecosystem for data management. In other words, a practitioner is aware that while she uses her Lilypad (or Pad) to record and reflect on her data, she also has the ability at her fingertips to connect with other practitioners to corroborate interpretations of that data and initiate discussion. Team members' Lipyads are connected, and help them to be more connected for ad hoc collaboration.

DATA COLLECTION, ANYTIME - ANY PLACE - ANY DEVICE



Findings

During our observations we witnessed participants were collecting data more routinely throughout the day. With the mobility of the Pad, participants were able to effortlessly collect behavioral data outside of typical classroom instruction time. We observed data being logged within the hallways during transitions from periods. Inside the lunchroom when the kids were eating and also outside during recess time while the kids were playing.

Within discussions, staff members expressed their appreciation for the design of the system. They communicated how they were pleased with the incident log feature of the system. For staff to be able to document anecdotal data in real-time, allowed them to have accurate accounts of activity taking place throughout the day. It was also indicated that previous to the Lilypad system, minimal anecdotal evidence was documented.

Participants also commented on how the automated point calculation feature saves them a lot of time and energy. Prior to Lilypad, individual student point calculations were performed manually at the end of each day.

While we did notice staff members engaged in the technology and more data collection taking place, we did not observe a significant increase in collaboration among staff around the data being collected. We found the 'Analyze' feature on the system was viewed on occasion by staff, but not used as a tool to get a better understanding of behavior trends.

Conclusions / Future Work

Our deployment study is on going and we are still doing observations to determine how participants interact with our system and how they plan to use the data they are collecting. Based on the attitudes and readiness to use our technology, we have observed team members improved relationships with data collection.

Drawing on our findings, we will focus on elaborating the Lilypad interface design to align more with the practicalities of the environment. We also intend to put forward research to expand the Lilypad system by incorporating multi-angle visual displays geared to improving collaborative discussions- backed by reasoning (different professoral expertise), driven by intelligent analysis (information: representation | behavior | retrieval | organization), for the purpose of intelligent understanding and outlook from different perspectives. And with these different perspectives, we aim to achieve a more defined area of inquiry with 'collaborative reflection' in mind.

Collaborative Reflection

The treatment teams reflect on a child's data together by sharing their knowledge and understanding of that child's progress, in order to corroborate their interpretations and make decisions about how to adjust interventions going forward.

The long-term outer loop shows four collaboration points over time, where team members have reciprocal interdependence. First, practitioners reflect on patient data to understand the needs of the patient and determine an appropriate intervention to move forward with. Second, multiple practitioners may be involved with an intervention, so reflecting on patient data can help practitioners apply the intervention consistently—for example by comparing patient responsiveness and immediate progress with different practitioners, or sharing successful strategies for applying the intervention and working with that patient. Third, practitioners evaluate the effects of an intervention by reflecting on the patient's data over time. Fourth, practitioners disseminate information on the patient's progress to others on the team, to practitioners not on the team, or to caregivers or family members.

The short-term inner loop shows how interdependent team members work together everyday to develop a shared understanding, which they draw on to make ongoing treatment decisions. Team members record data, reflect on the data both individually and collaboratively, and corroborate interpretations of the data with others.