Kellar Instructional Handheld data
KIHd System
Research

Heidi J. Graff, PhD
George Mason University

The KIHd Concept

- Research
  - Kellar Instructional Handheld Data System (KIHd System) http://kihdsystem.gmu.edu

    "Improving student performance through assessment using performance- centered technology."

    A real time wireless handheld data collection and display system designed to collect and analyze student performance data which can be immediately used to make instructional decisions

The KIHd History

- Why the KIHd System was Needed
- Immersion Program for Design and Development
- Alpha Phase, Testing for Usability
- Beta Phase, GREAT Program
- Pilot Technology Study
- Steppingstones Grant
  - Dissertation
  - Grant Update

Immersion Program

The KIHd project served as a practicum project for the 2004/2005 George Mason University Graduate Immersion Program for Instructional Design and Development.

http://it.gse.gmu.edu/immersion/Immer/

Alpha Phase

Following the integrative learning design instructional process, this usability testing of four teachers and four parents determined performance problems and identified areas in need of revisions for the KIHd prototype.

Beta Phase-GREAT Study

This phase described and offered interpretations of using technology via the KIHd System from the perspective of eight instructors and 12 students at the University level.

Pilot Technology Study

- Examined teacher's views and usage of technology at the Green School and to determine the likelihood of implementing a systematic and extensive research agenda between the Green School and George Mason University.

Research Questions

- What were teacher perceptions about technology?
- How was technology currently being used?
- What were some perceived barriers to technology adoption?

Stepping Stones

The purpose of this study is to investigate teacher usage of the KIHd System in a metropolitan school where discrete trial teaching (DTT) is employed with students on the Autism spectrum.

Research Team

- Co-PI: Shuangbao Wang, PhD
- Co-PI: Yoosun Chung, PhD
- Senior Researcher:
  Michael Behrmann, EdD
- Project Coordinator:
  Heidi Graff, PhD
- Research Assistants:
  YouRi Shim
  Kavita Mittapalli

Areas of Investigation

- **Data driven decisions**

  How teachers are making data driven decision and given different parameters will those decisions remain constant?

- **Teacher planning**

  How do teachers use of planning and will provide insight to other activities that were previously prohibited due to a lack of time?

Dissertation

The purpose of the current study was to explore the influences of technology adoption and usage of the KIHd System, a handheld data collection and analysis tool, in the same setting, where discrete trail teaching (DTT) and Applied Behavior Analysis (ABA) was employed with students on the Autism spectrum.

Technology Adoption and Usage of a Data Collection Tool in a School Setting Servicing Students with Autism: A Qualitative Look at the Process and Perspectives

A qualitative study on adoption and use of the KIHd System was implemented for a twenty week period to ascertain perceptions of teachers during the adoption process in four main areas: data collection, technology usage, training, and the dynamic culture of a school environment.

Statement of Problem

- Data collection and the subsequent visual analysis are paramount to providing the correct intervention to students with Autism.
- Some schools collect the data, yet do not take the time to chart- paper and a pencil are very cumbersome and time consuming.
- Other schools demand their teacher complete this rigorous task of hand charting once a day.
- How can evidence-based decisions be made on a lesson when the evidence of progress, in this case the chart, is not complete until the end of the day?
- With new technology now allows the data to be entered and charted simultaneously, **However, with this new break through, there are new areas of concern that need to be scrutinized.**

Research Questions

- *Training*
- What are the attitudes of the teachers about the training received on the KIHd System technology?
- What types of training and support do teachers need to use KIHd System technology in the classroom?
- *Technology Usage*
- What are teacher perceptions of the KIHd System technology in regard to the beginning adoption process of this innovation?
- What are the characteristics of a teacher who uses KIHd System technology?

Research Questions

- *Data Collection*
- How does the KIHd System technology fit into a classroom servicing students with Autism?
- How are discrete trial training sessions described using the KIHd System technology?
- *School Culture*
- What are the perspectives of administrators and technical support staff in regard to the beginning adoption process of this innovation?
- What are the dynamic roles of administrators, technical support staff, and teachers in the process of technology adoption?

Literature Review

- Effective use of assessment data involves summaries, graphs, and rule-based decisions
- (McLean, Worley, & Bailey, 2004).
- Graphic representations assist with this process (Snell & Brown, 2006).
- Visual format promotes communication between parents, teachers, and other school personnel (Deno, 2003).
- Data collection systems need to be simple, efficient, user-friendly (Meyer & Janney, 1989).
- Research has shown that on-going monitoring of student progress generates more appropriate
- decisions regarding instruction (Farlow & Snell, 1989; Fuchs, Fuchs, & Hamlet, 1993).
- Greater outcomes for students (Todman & Dugard, 2001).
-

Setting

The Green School Autism Program serves 43 students in 6 classrooms at a 1:1 and 1:2 teacher to student ratio. Individualized education programs with a focus on functional life skills are developed following ABA methodology. Green School provides an 11 month program.

Participants

Sasha
Director

Anna
Assistant
Director

Mary
Program Support
Specialist

Katie
Head Teacher

Campbell
Student

Carmen
Senior Assistant

Evan
IT Specialist

Ward
IT
Technician

The Research Team

Data Sources

Triangulation of data sources

Observations, meetings, and project meetings

Member Checking

Respondent Validation

E-mails, Likert questionnaires, teacher feedback, demographic questions, field notes, fidelity sheets, site visit notes, meeting notes, and project meeting notes

Interviews

Data Analysis

- Reread interview transcriptions, reviewed all the observational materials, meeting notes, e-mails, and questionnaires.
- Coded by hand and used the computer software programs NVivo and Inspiration.
- Wrote researcher memos.
- Created concept maps, diagrams, and personas.

Note Categories

Type	Total	Major Topic	Percentage
E-mails	35	Questioning and information	37%
Meeting note	9	Procedures	44%
Field notes	27	Data collection	99%
Fidelity sheets	33	KIHd System	43%
Site visit notes	5	Glitches	60%
Project meeting notes	17	Glitches	29%

NVivo Codes

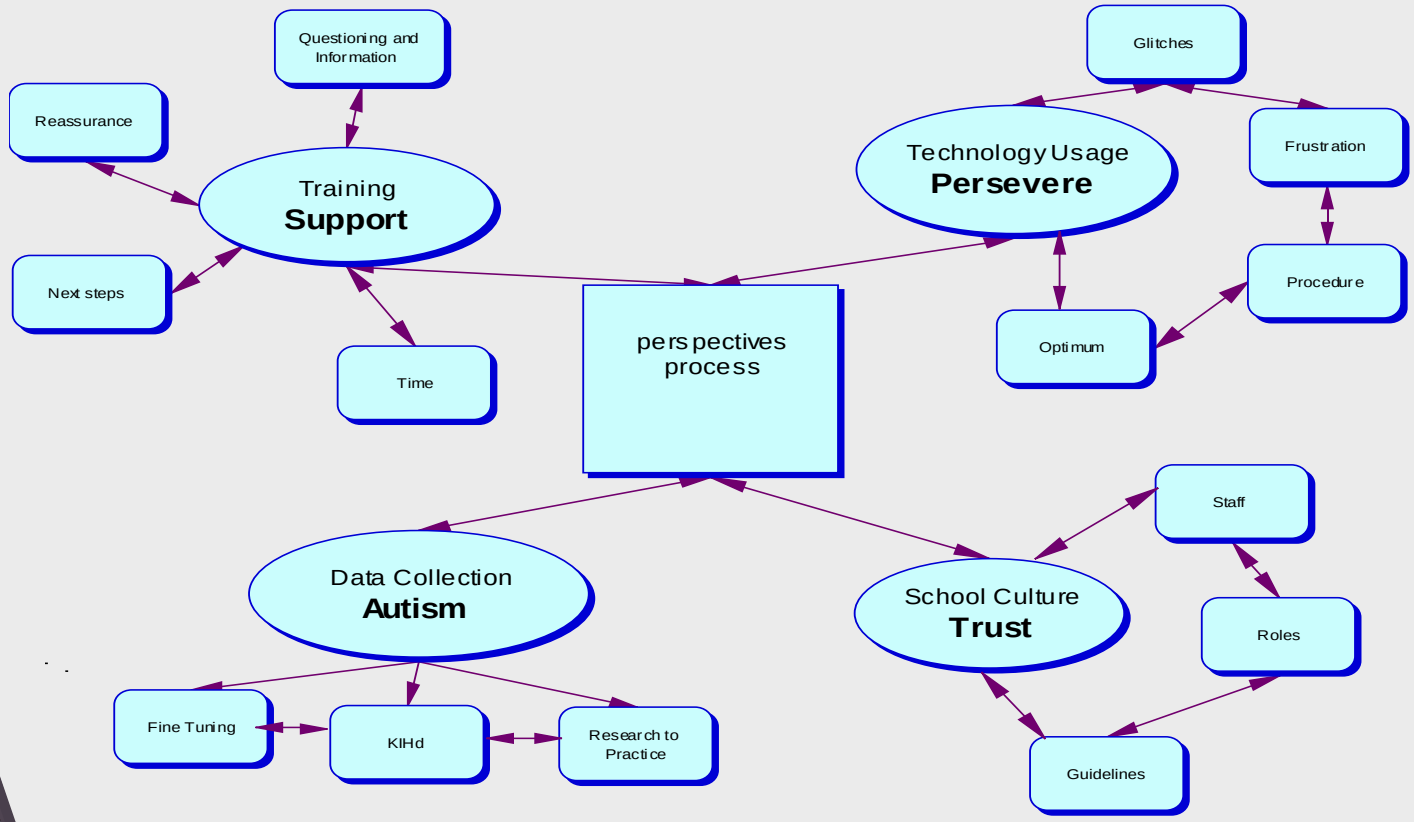
Category	Sub-category	Totals
Training	Questioning and information	8
	Reassurance	12
	Next steps	18
	Time	6
Technology usage	Glitches	4
	Frustration	11
	Procedures	21
	Optimum	10
Data collection	Fine tuning	4
	KIHd	12
	Research to practice	10
School culture	Staff	9
	Roles	23
	Guidelines	6

Researcher Memo Highlights

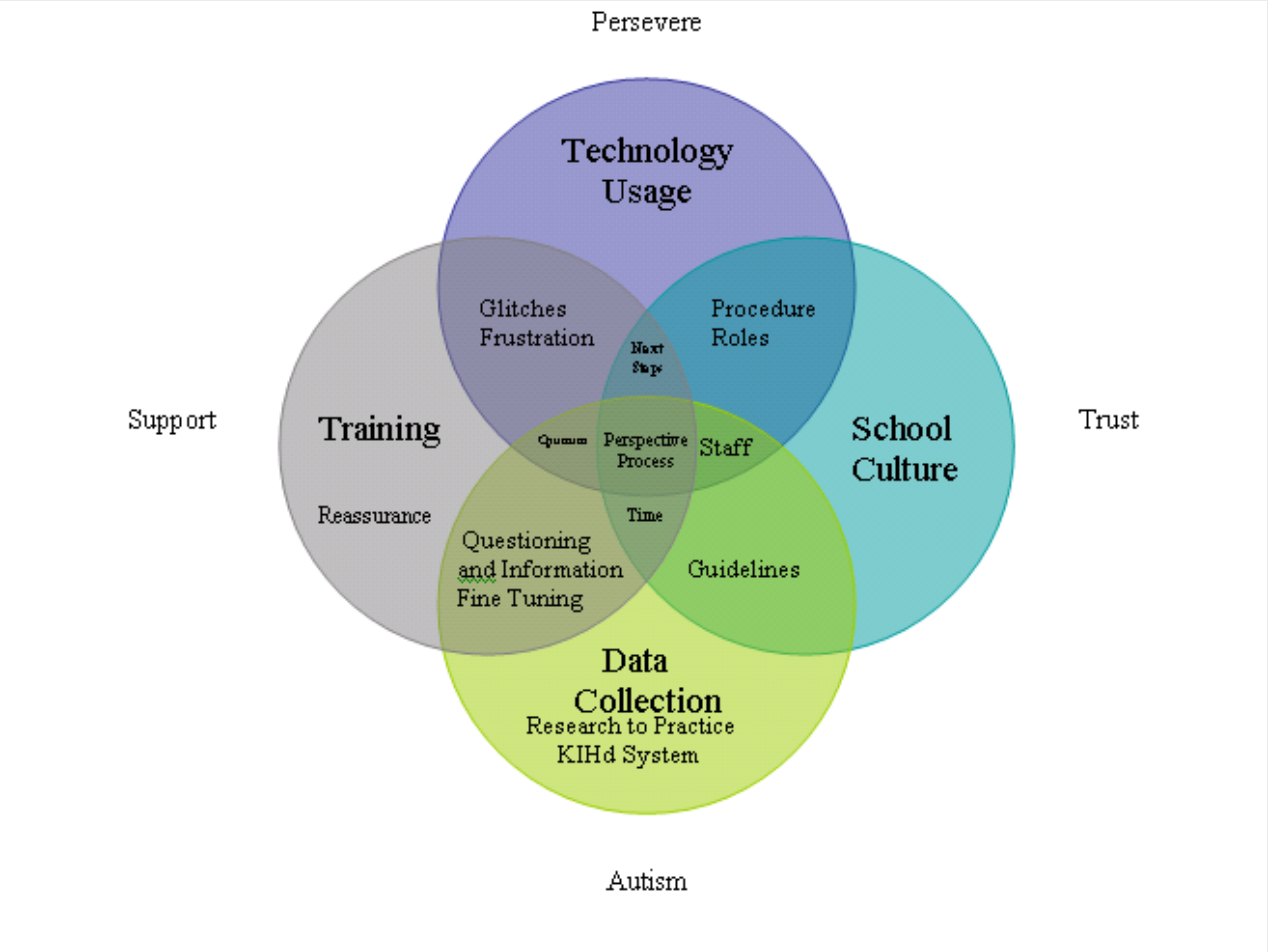
Date	Topics
Jan. 12	With pilot has training and technology (AT) concerns
	With new technology have added data collection and school culture since policies and who involved have not yet been set
Jan. 13	Significant issue: Perspective with families, documented collaboration with families
	No studies on perspectives of teachers with this population
	Perspective on teachers using new technology and pilot
	No studies on teacher perspective of this population using new tech collect data
Jan.14	Substantive coding Trust
	Merge questing and information into one code
	Time of interviews 11/1, 11/8 etc….
	Substantive code under Training is support??? Not its own category??????
	Support Trust

Qualitative Findings

Concept map



Qualitative Findings

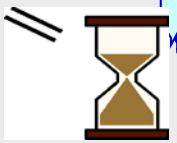


Administration Personas

I really want to be a part to make sure our visual representation's problem solving is consistent with what is being done in the classroom for training purposes and not too complicated. So that part I'm invested in, the part that could potentially be long term for the program.

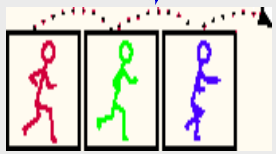
Sasha
Autism Director

Through out the whole thing I was just worried about the time constraints, we do have so many demands and so many expectations for our instructors and head teachers, so I'm kind of been like a mother hen always trying to watch out for their time and trying to protect them. At times, I felt, I thought it's really going to take up a lot of time but it hasn't. I keep realizing that it hasn't taken up that much time. The end result is that it saves time.



Anna
Assistant
Director of the Autism
Program

From my end, I want to make sure that the team is well supported but I think it was very well covered. I think that you were very quick to respond to any type of concern. My only concern was to be more involved from the get-go and I have told Anna that you've got it, run with it. Now, that's it started going, I want to know, okay, so show me how to do that.



Mary
Program Support
Specialist

Teacher Personas

It's going well. I mean it has its' ups and down. With technology it has...it has problems. But you should be able to anticipate with that with this kind of data collection. It's a great system, we have so much data collection here so it... it negates the paper and pencil. I am very pleased we are participating.

Katie
Head Teacher

But I am also training right now. Between the clusters of classrooms, we have a teaching assistant that goes back and forth so it's supposed to help, I take Katie's rotation and the shared rotation is supposed to take mine. And then Katie is out of the rotation and she does assessments-it frees up some time.

Carmen
Senior Assistant

Technical Support Personas

Yes, if it's going to fly, we are going to make the decision. We have to approve the plan within the IT department and then let it go to the business office for approval and budgeting considerations.

Evan
IT Specialist

The business office acts as a liaison between the Autism administration and the Technical staff

Ward
IT Technician

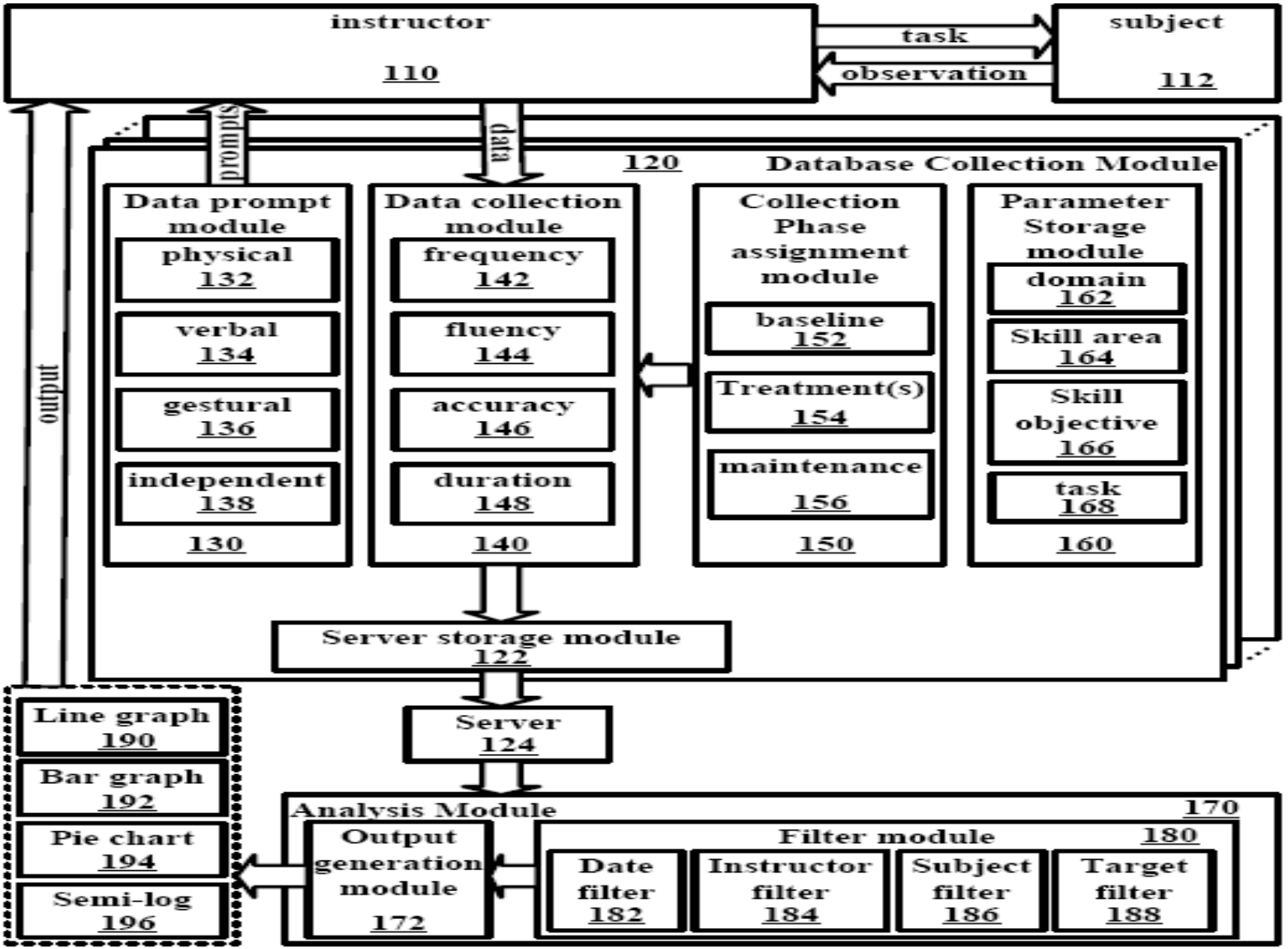
Conclusions

- *Training*-A factor that influenced the perceptions of technology was training. Support during training was crucial.
- *Technology*-Teacher persistence was the most important characteristic to having success.

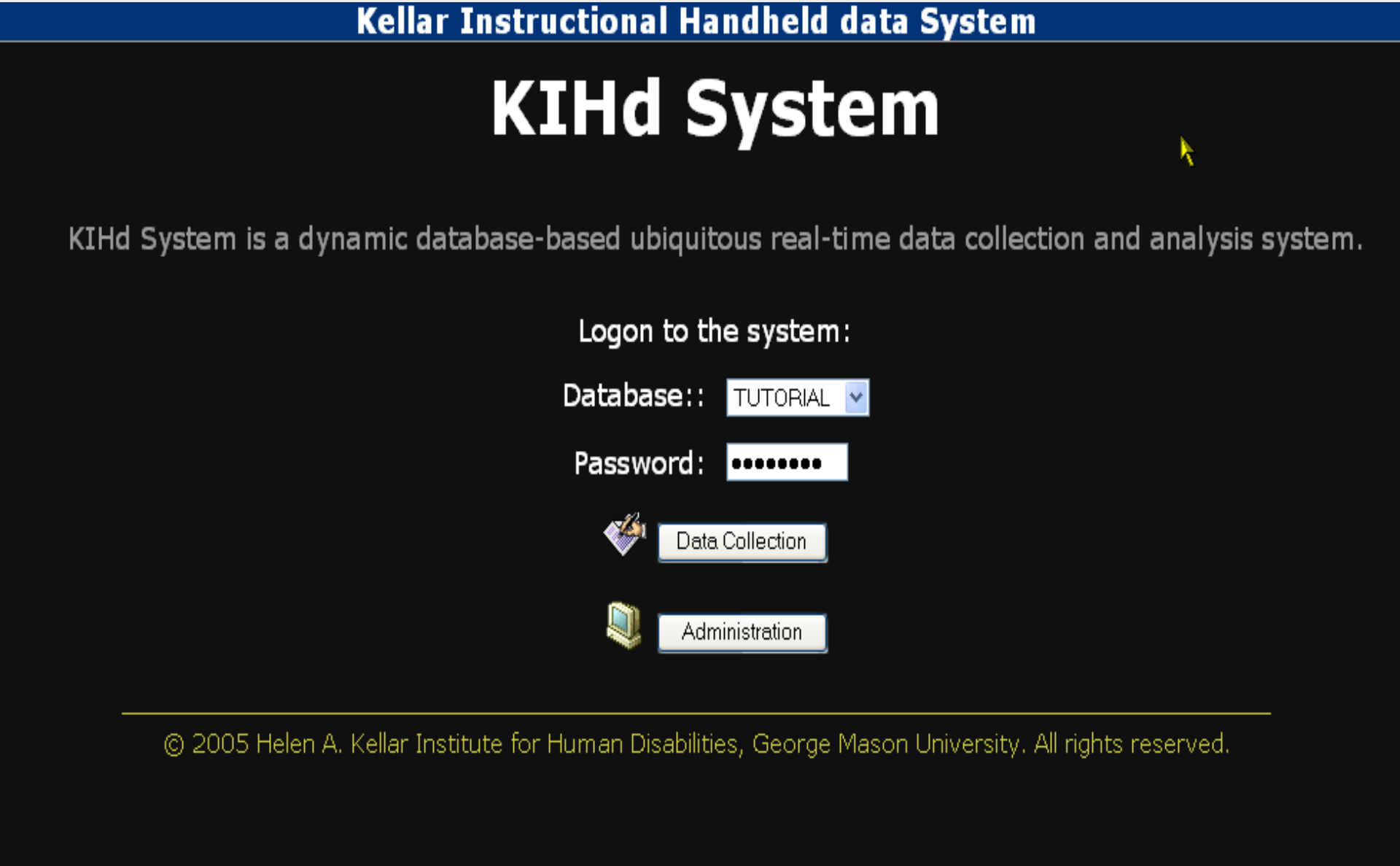
Conclusions

- *Data Collection*-In such a busy environment, technology, like the KIHd System, would maximize data collection while requiring a minimum amount of teacher time.
- *School Culture*- Roles were less clear and accountability for who was ultimately “in charge” was a not a sole individual but a group.

Patent Flow Chart



KIHd System


Kellar Instructional Handheld data System
KIHd System
KIHd System is a dynamic database-based ubiquitous real-time data collection and analysis system.
Logon to the system:
Database::
TUTORIAL
Password:
Data Collection
Administration
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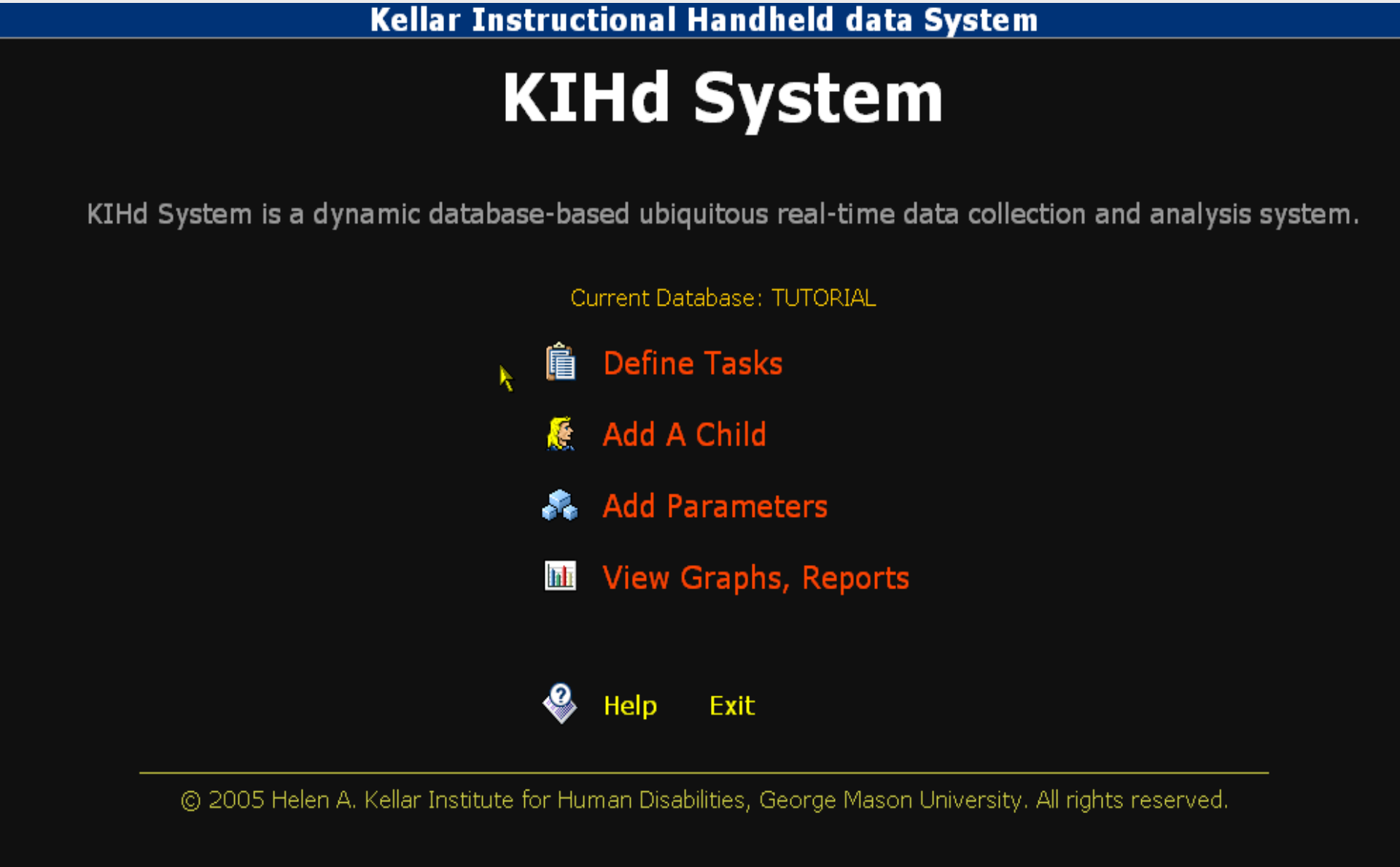
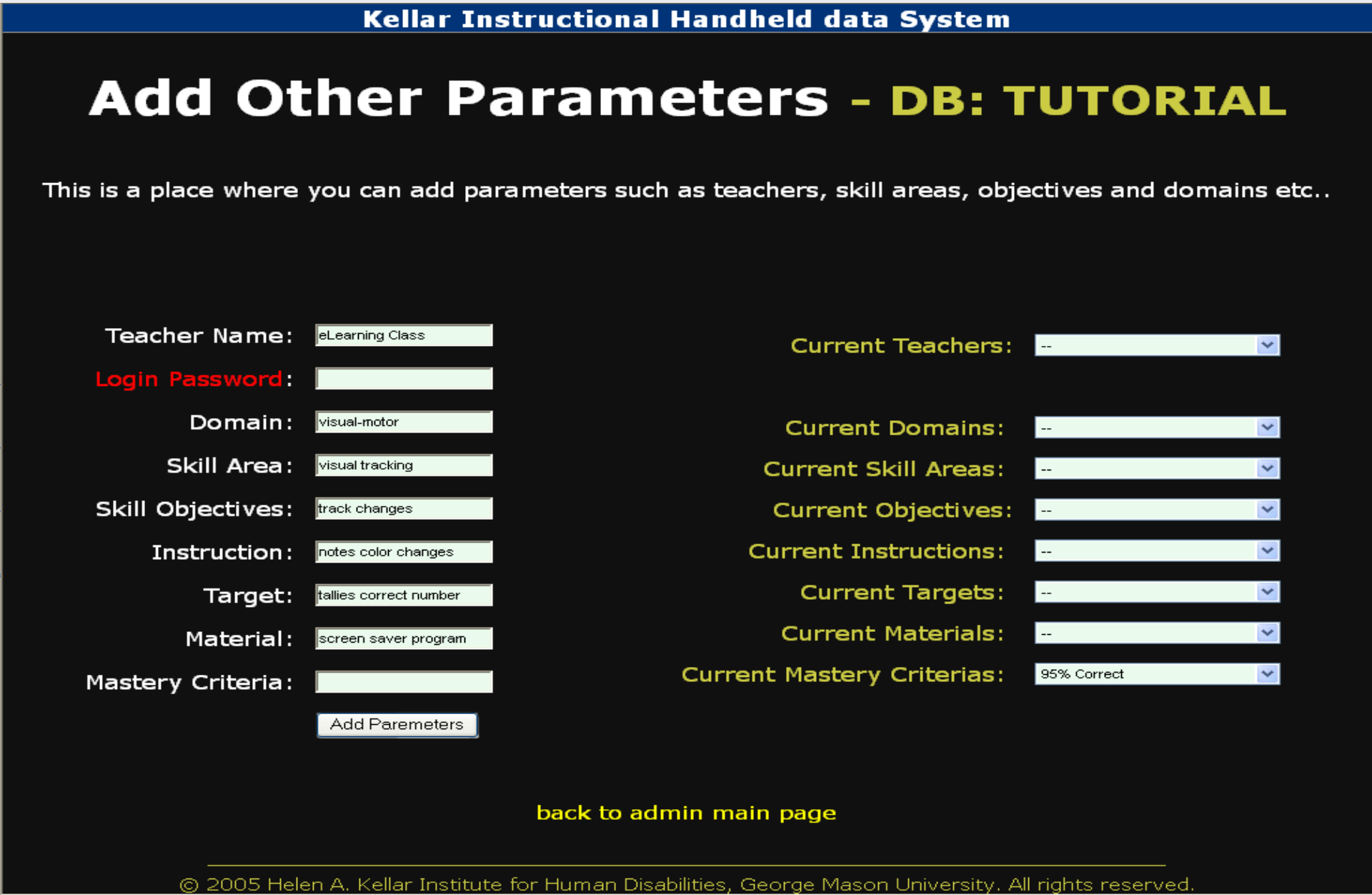
Administration Page



Input Information



Add New Task - DB: TUTORIAL

Tasks already in system:

--

Edit

Task Name: track color changes Freq *Required

Domain: visual-motor *Required

Skill Area: visual tracking *Required

Skill Objectives: track changes *Required

Distractors: 0

Instructions: notes color changes

Targets: tallies correct number

Material: screen saver program

Mastery Criteria: 95%

Prompts

- full physical
- verbal
- gestural
- modeling
- faded physical
- faded verbal
- independent
- positional

Optional Prompts

track visual changes

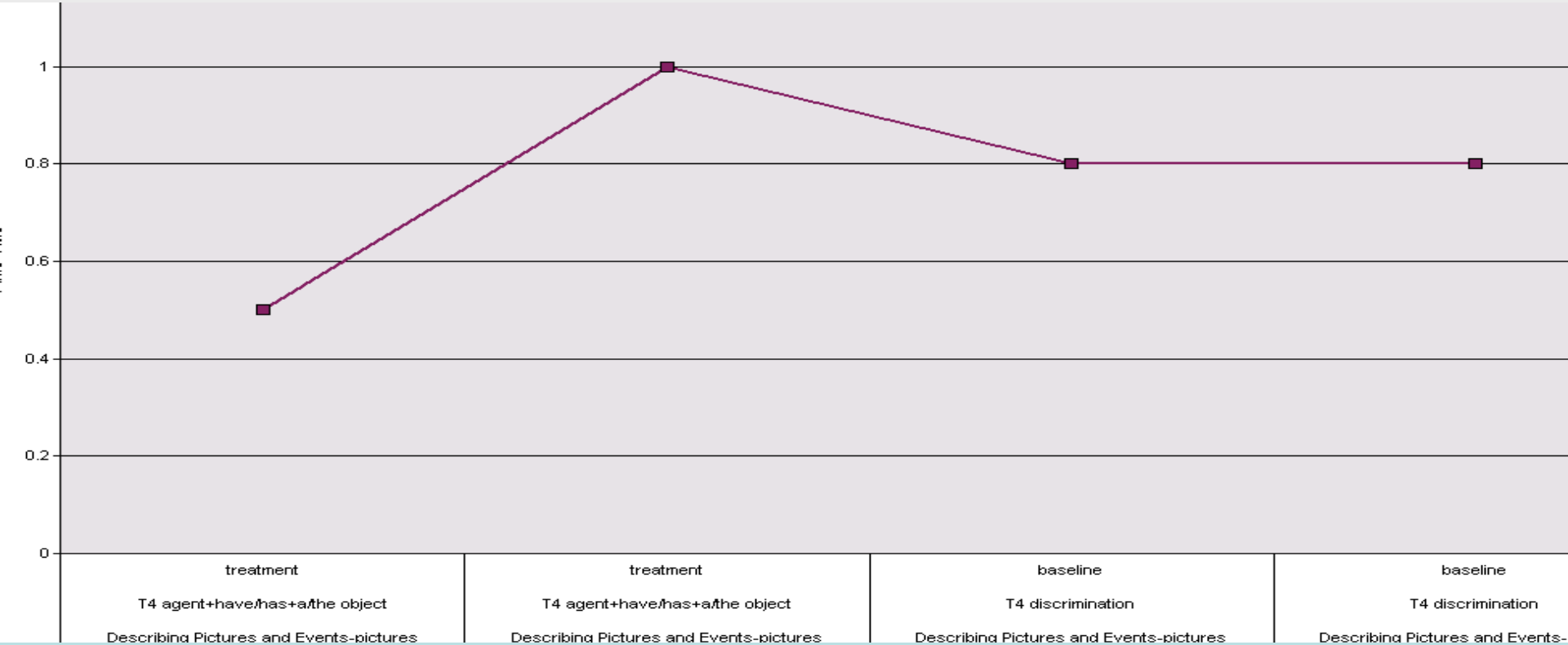
Datatype

Frequency

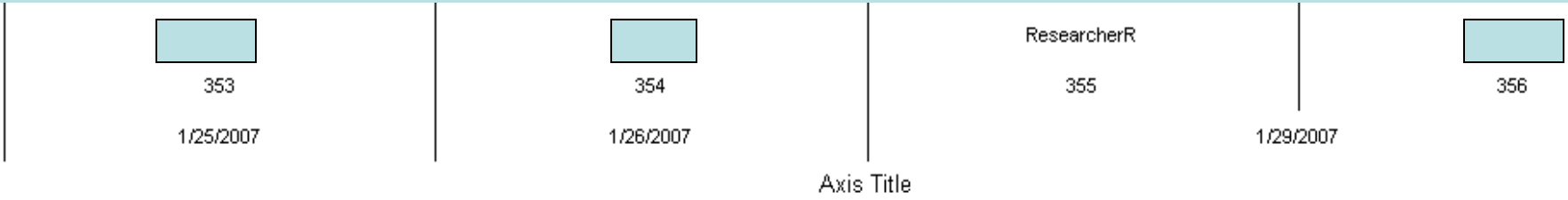
Add Task

back to admin main page

Graph

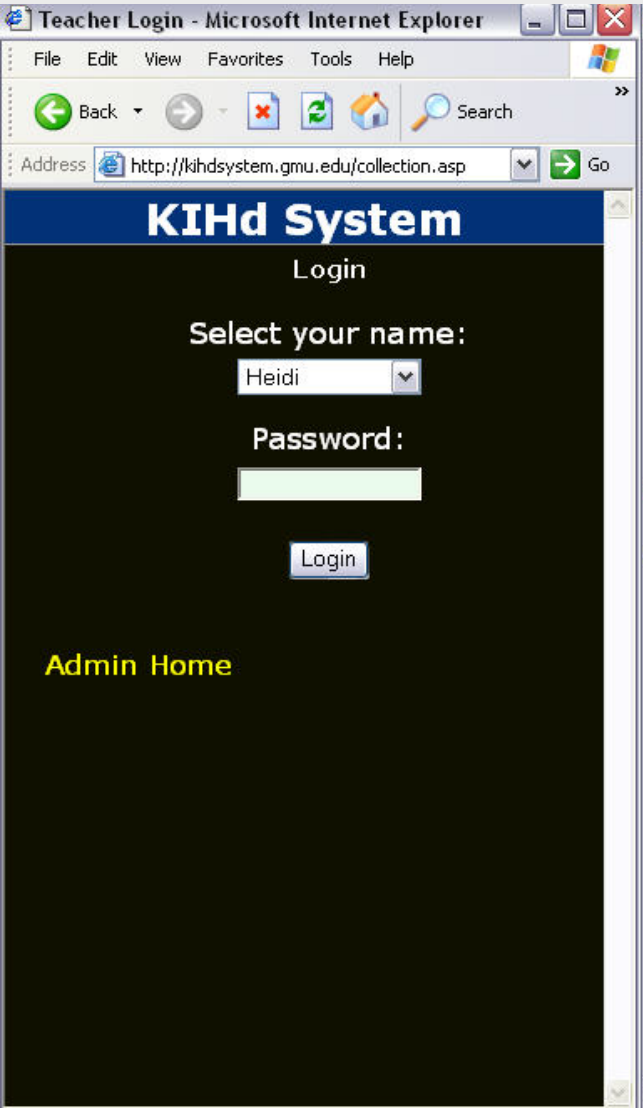


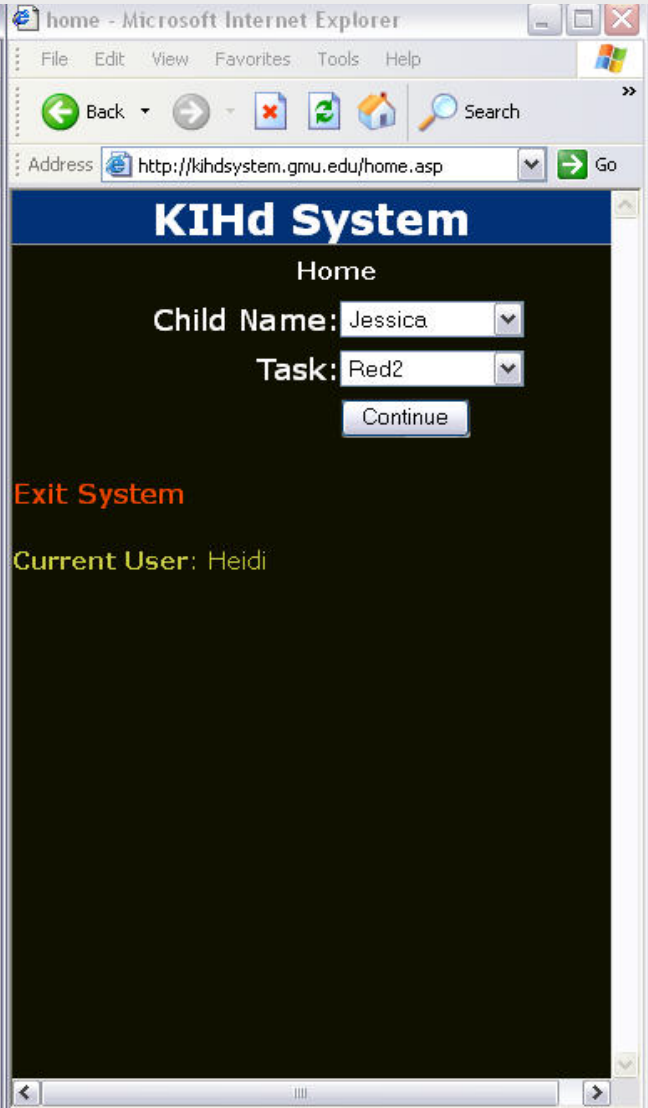
Student's Name

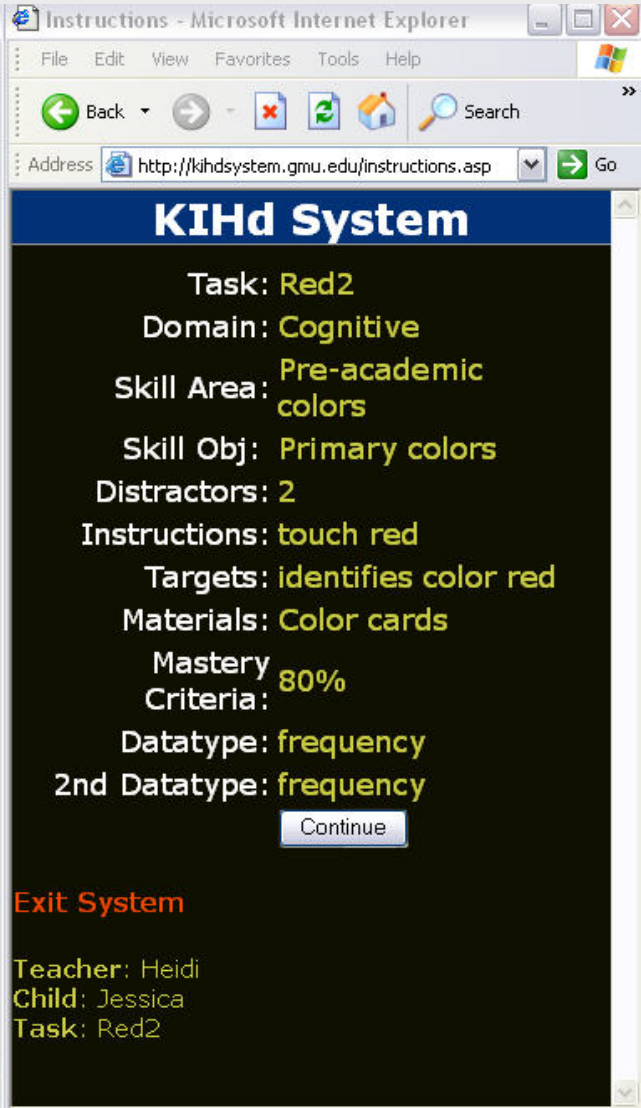


timeTag	ID	teacher	student	skillObj	taskName	phase

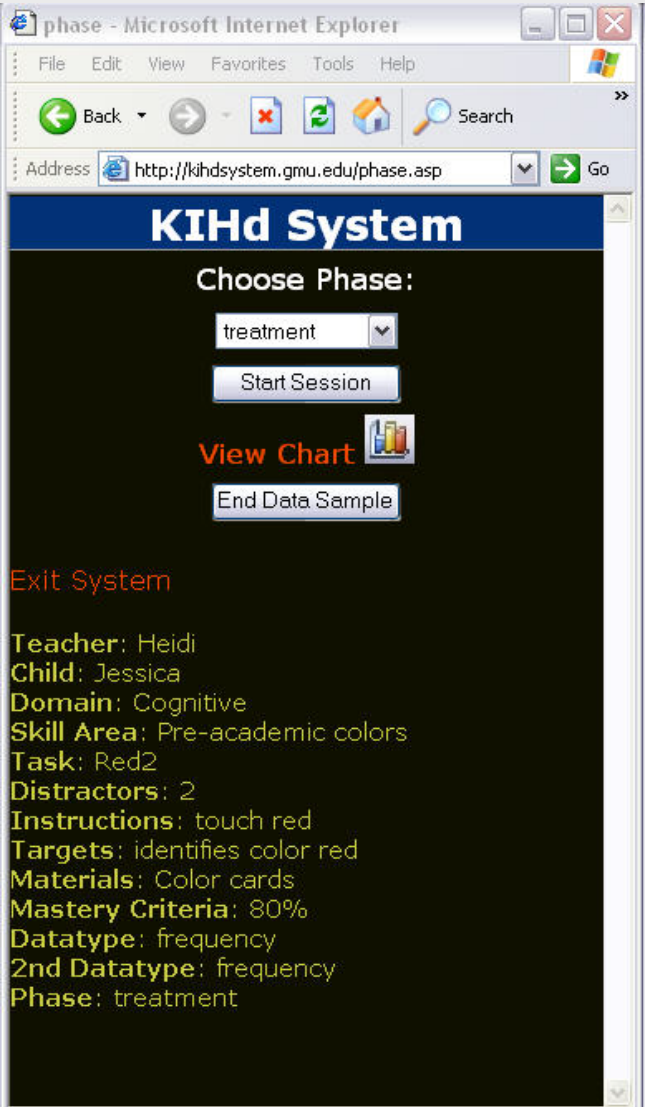
Data Collection - PDA

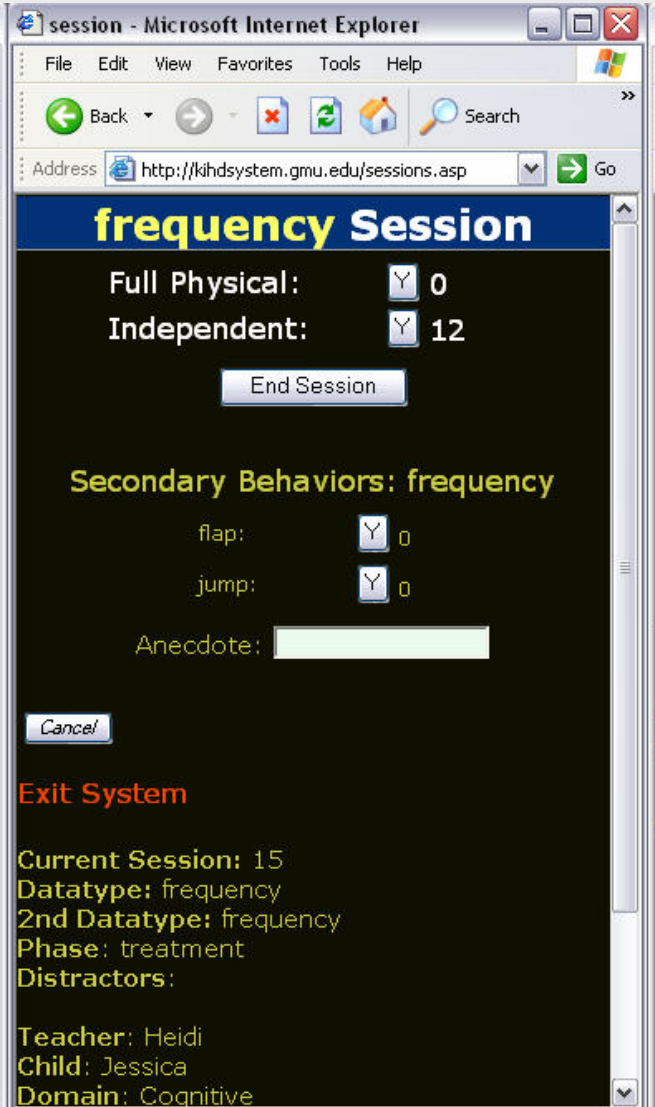


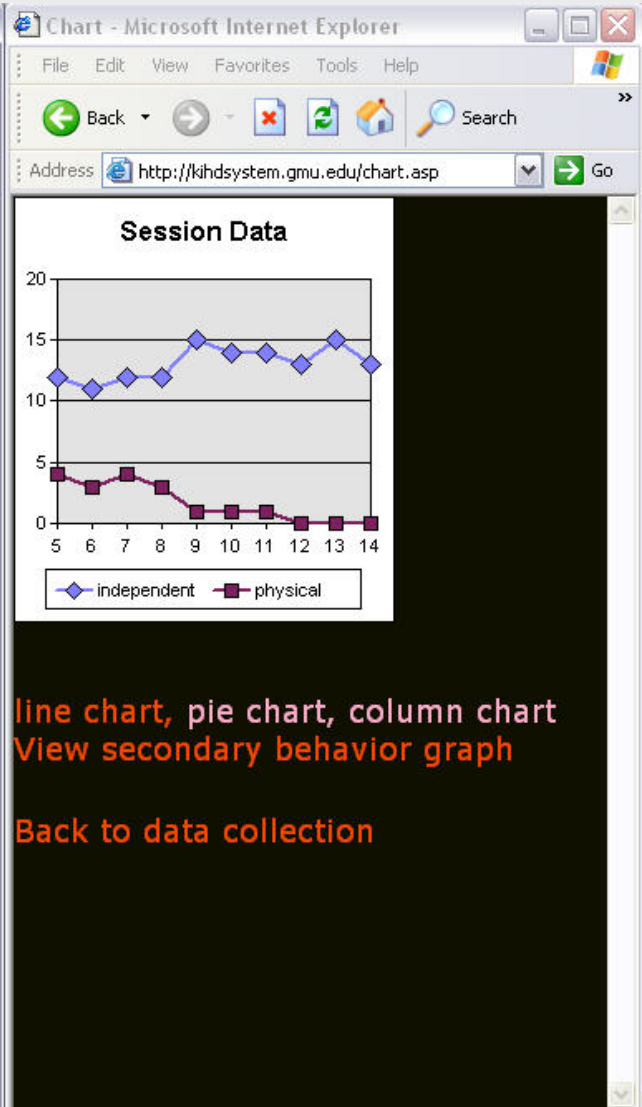




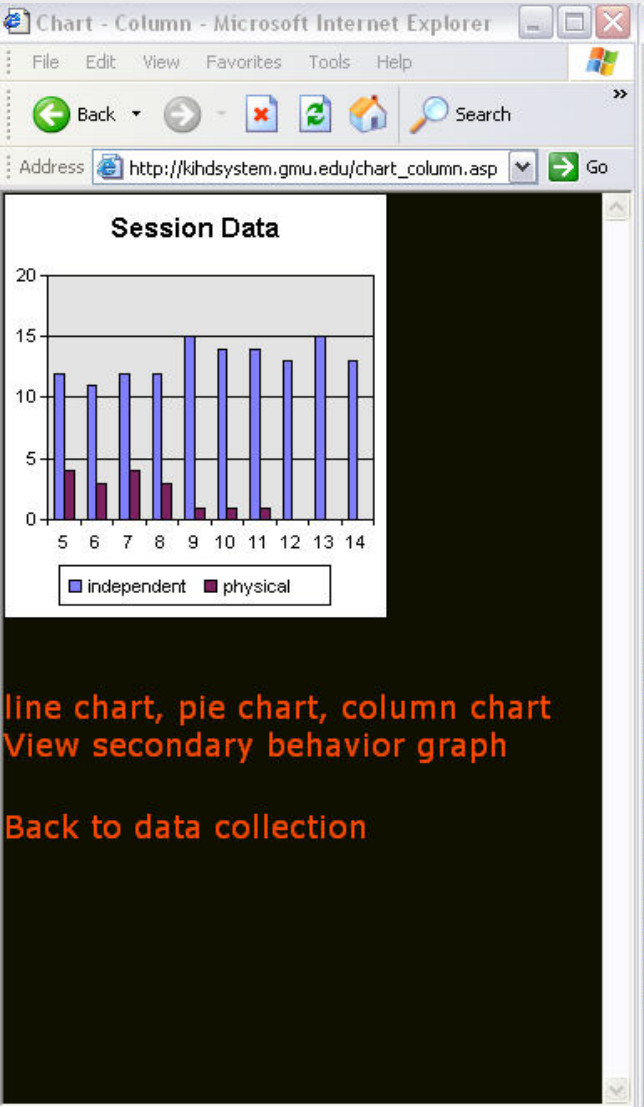
Data Collection - PDA

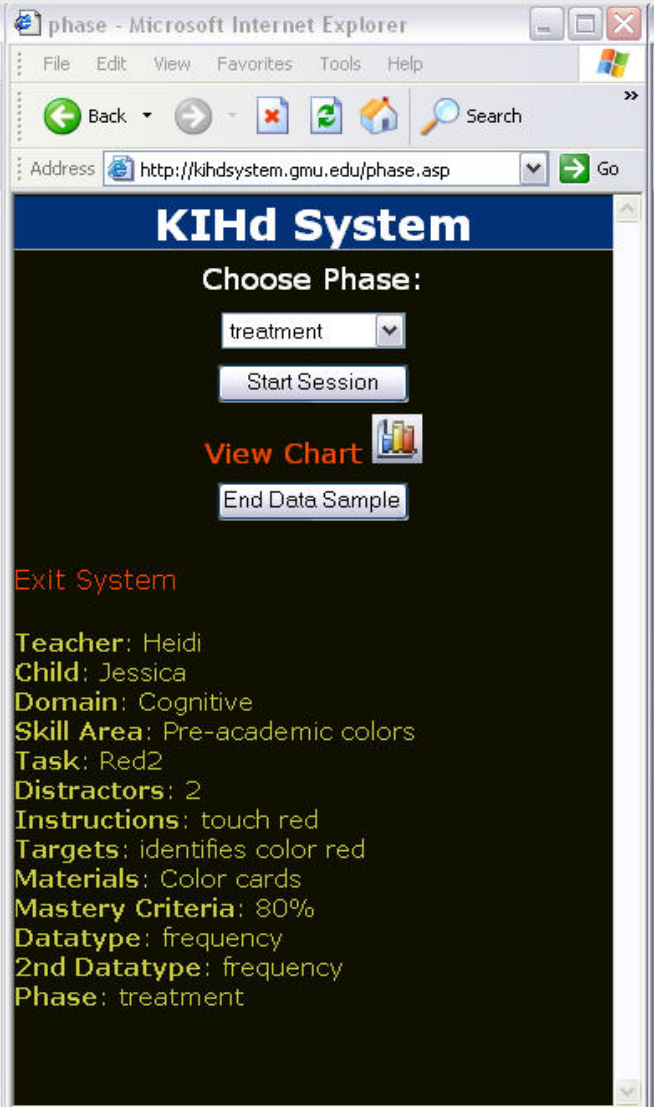


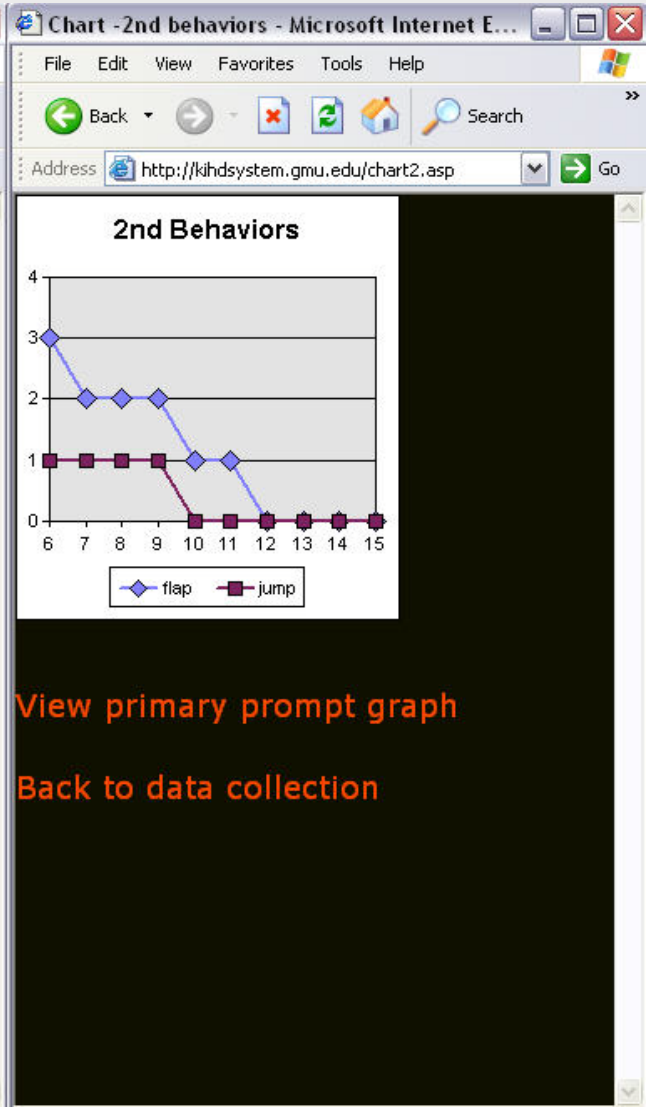




Data Collection - PDA







Steppingstones Grant for Spring

- Is there a teacher pattern to viewing the graphs to make data driven decisions?
- How many times do the teachers look at the graph in proximity to the time of data collection and afternoon chart time?
- Does the randomizations test confirm or add to the visual analysis of the semi-logarithmic chart or line graph to make decisions?
- Does the KIHd System enable reliability?
- Will teachers continue to use or add additional students to the KIHd System even after the base study has been completed?

4 Weeks Teachers Training

- Trained teachers how to use KIHd system
- Gathered teacher's demographic information
- Taught teachers how to input the data in KIHd system
- Showed teachers how to view the interactive graph

How to use KIHd System

1. Go to http://kihdsystem.gmu.edu
2. Click the "**Data Collection**" tab
3. Find your name, Enter Password, then click "**Log In**"
4. Select **Student**
   - For practice, you need to select "Student1".
   - For real trial, select your student who you are working on.
5. Select **Target**, then click **Continue**
6. Make sure you are in the right place.
   - If you find error, click **Back** button **in Internet Explorer**.
     If it is ok, click **Continue**.

How to use KIHd System

7. Choose Phase
   - View Chart – First, you need to initiate the session in order to view chart correctly. In order to initiate the session, click **Start Session**, then click **Cancel**. Then click **View Chart**. You will need to view the chart again after your session is completed. Click "**Back to data collection**"

   - To start to collect data, click "**Start Session**"
     - Y – Correct
     - N – Incorrect
     - When you make a mistake, simply click **Back** button in **Internet Explorer**.
     - When you want to start session all over again, click "**cancel**" button, then click "**Start Session**" again.

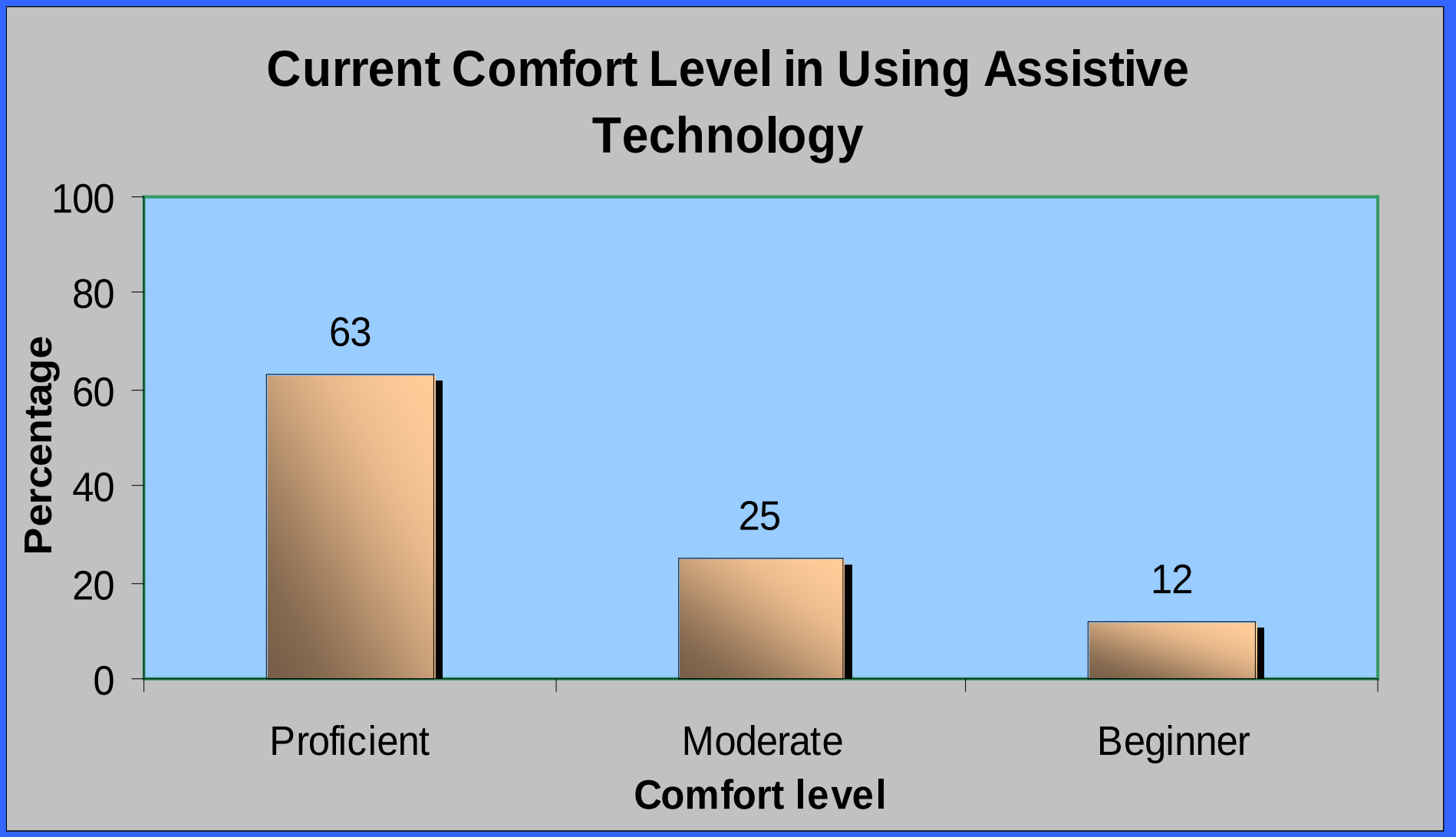
   - When finishing data collection, click "**End Session**"
8. **View Chart** again to see what you just collected. Then click "**Back to data collection**"
9. Make sure you end the KIHd system (**End data sample** > **Log Out** > **Exit**)

IMPORTANT: Make sure you connect PDA to the charger after you use

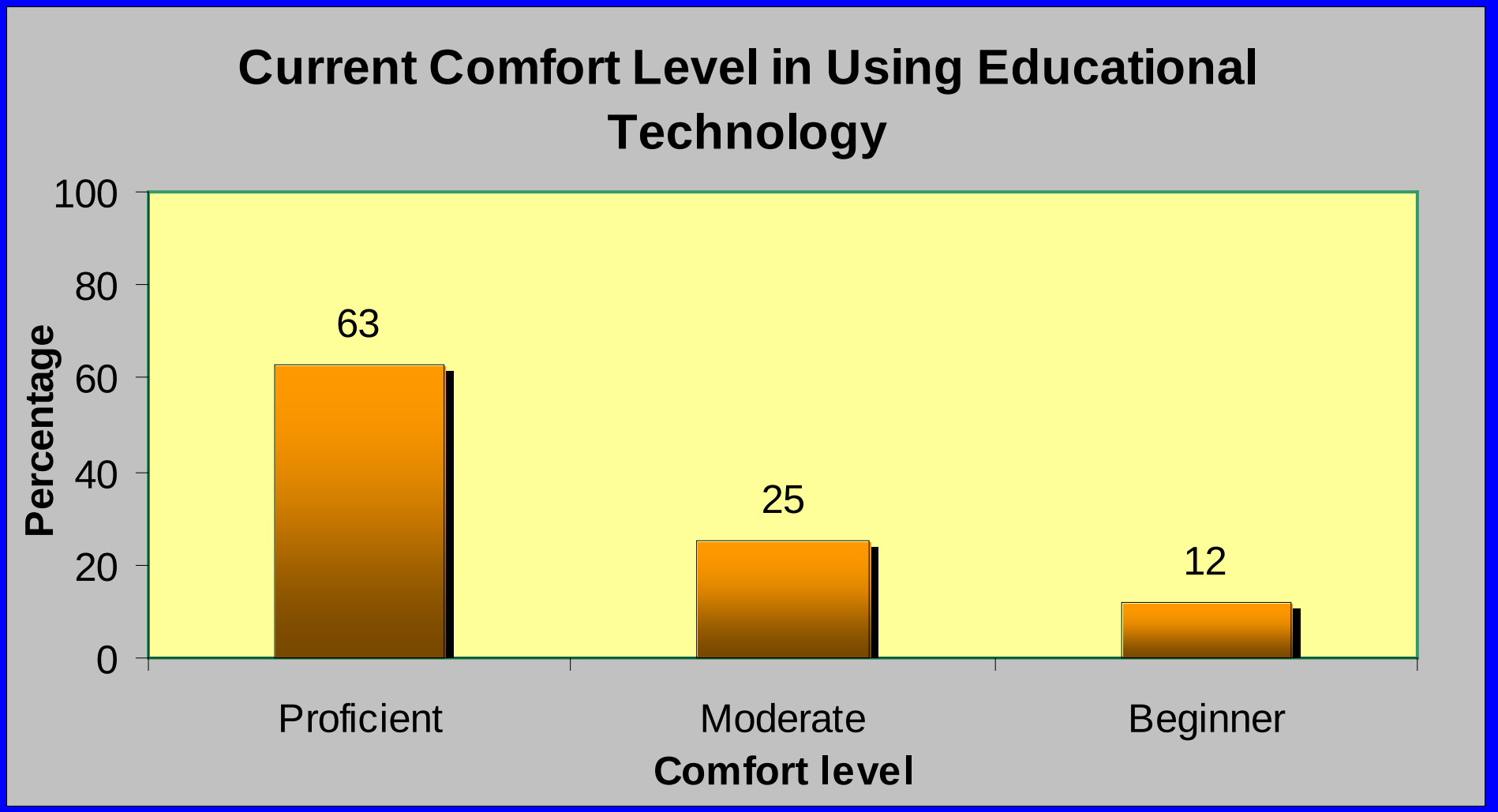
Data from teacher demographic sheets (n=8)

All teachers	Average number of years of teaching experience	Average age of teachers	Number of years at School
Mean	2.4	24	1.4 (Range 0.5 to 5 years)

Comfort Level

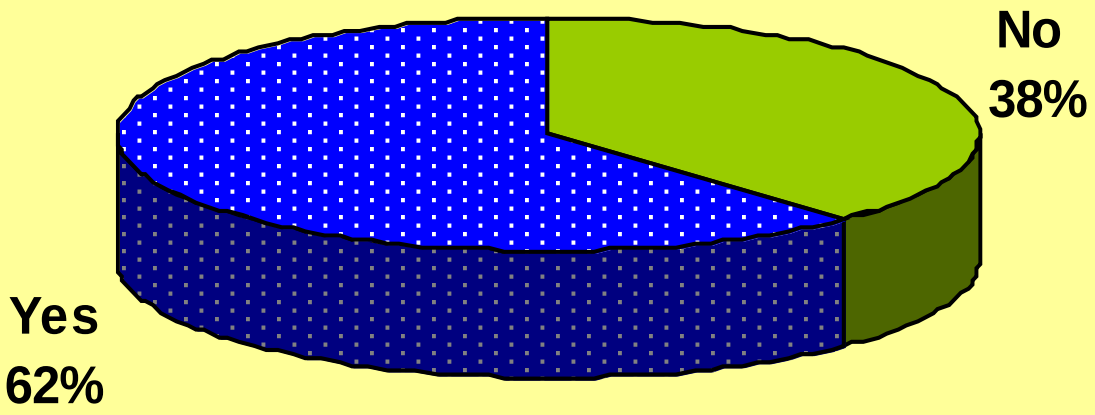


Comfort Level



Experience Level

Is this your first experience using a PDA?



New Fidelity Checklist

Researcher's name_____ Room no. _____ Date _____Time _____

Instructor/s name/s_____ Student/s name/s _____

Target [ ] Phase [ ] Program [ ]

Accuracy Frequency Duration Fluency

Number of correct [ ] Number of incorrect [ ] Percentage, If known [ ]

Instructor/s looked at graph [Y N]

Technical help requested [Y N] Number of times [ ] Duration [ ]

Reason for technical help _____

_____

Any decision/s made during technical help [Y N]

Explain _____

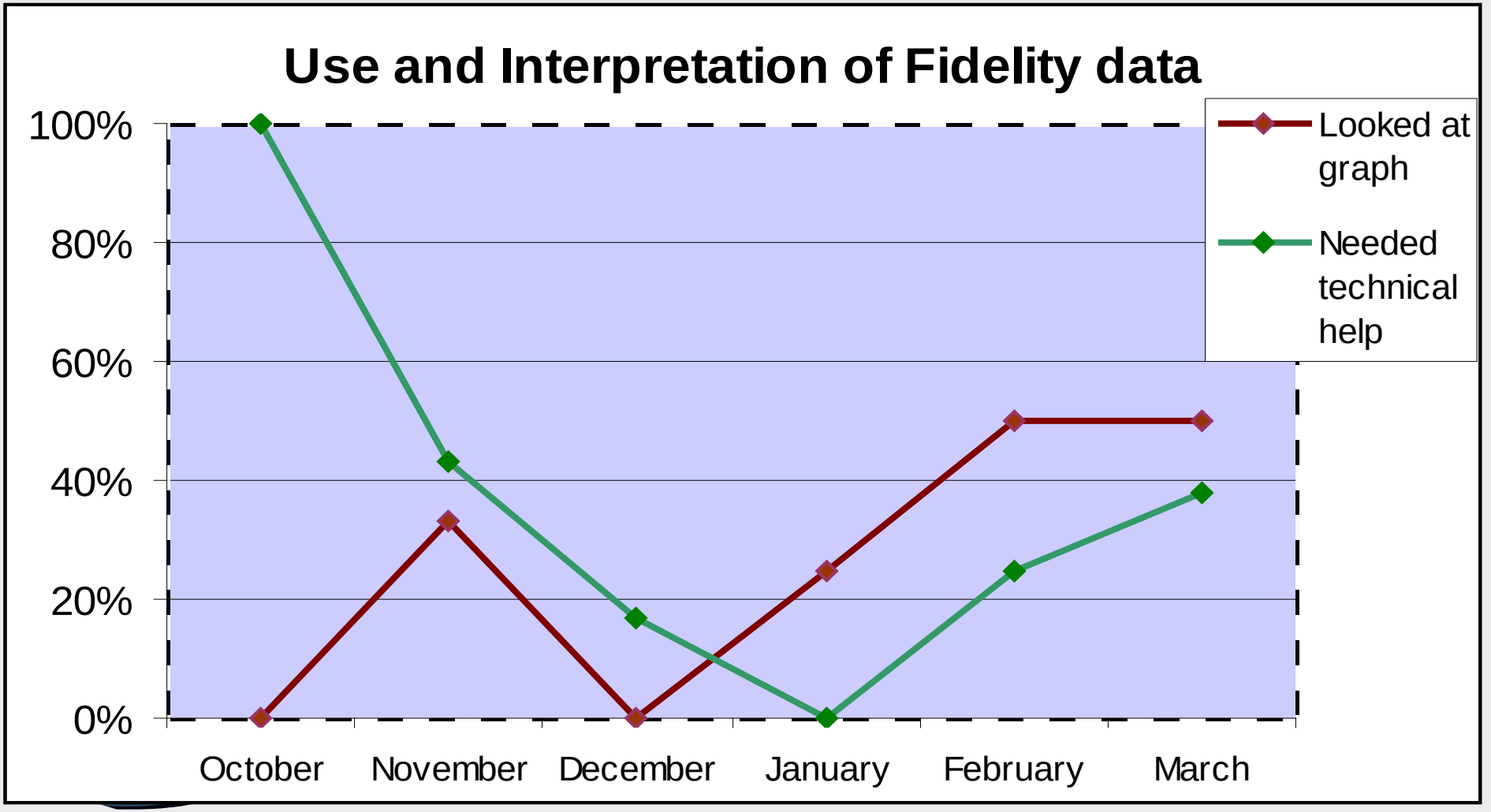
Secondary behavior observed/tracked [Y N]

Other comments _____

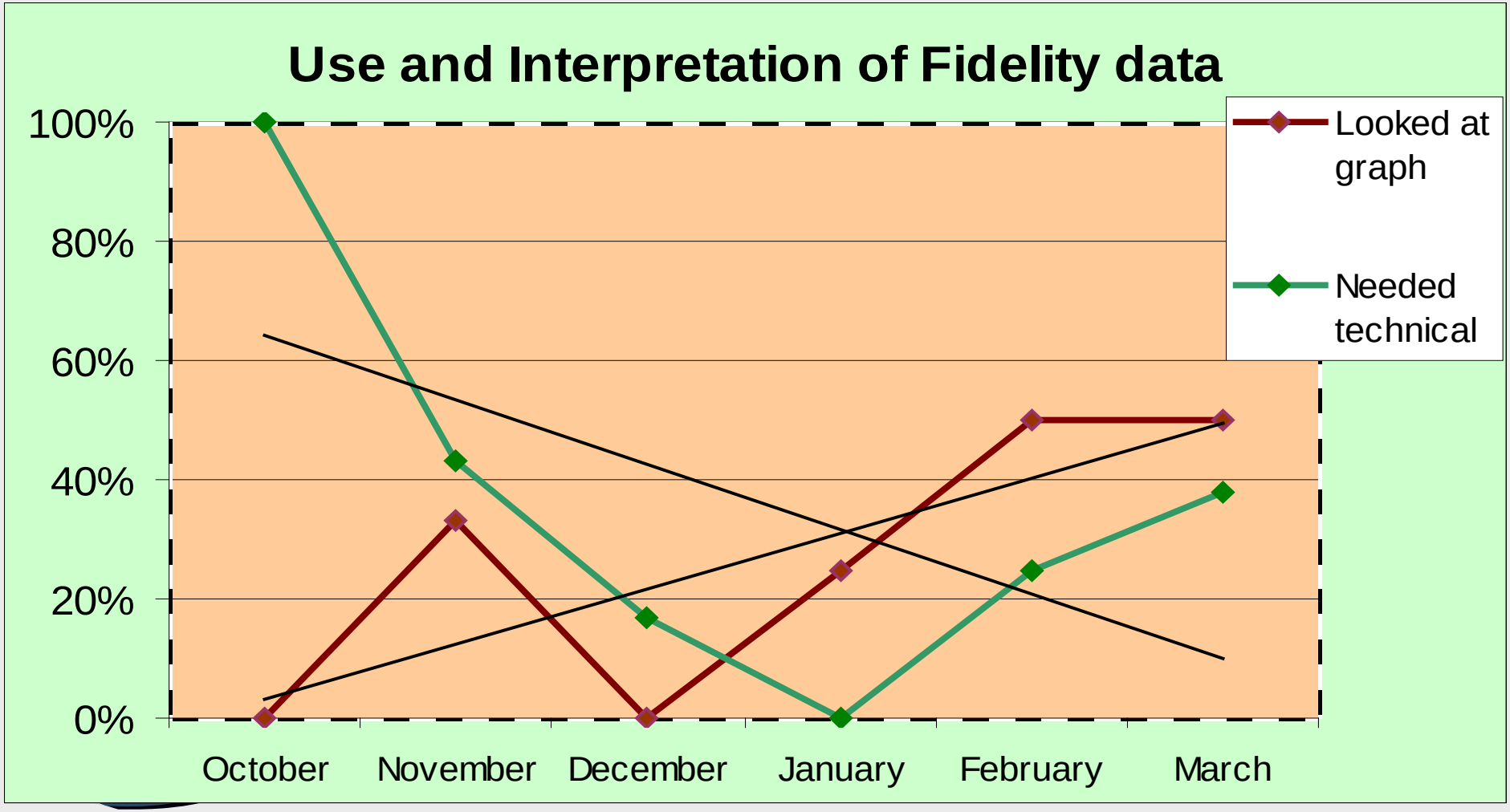
Data from the fidelity sheets

Number of times	October	November	December	January	February	March
Looked at graph	0	33%	0	25%	50%	50%
Needed technical help	100%	43%	17%	0	25%	38%

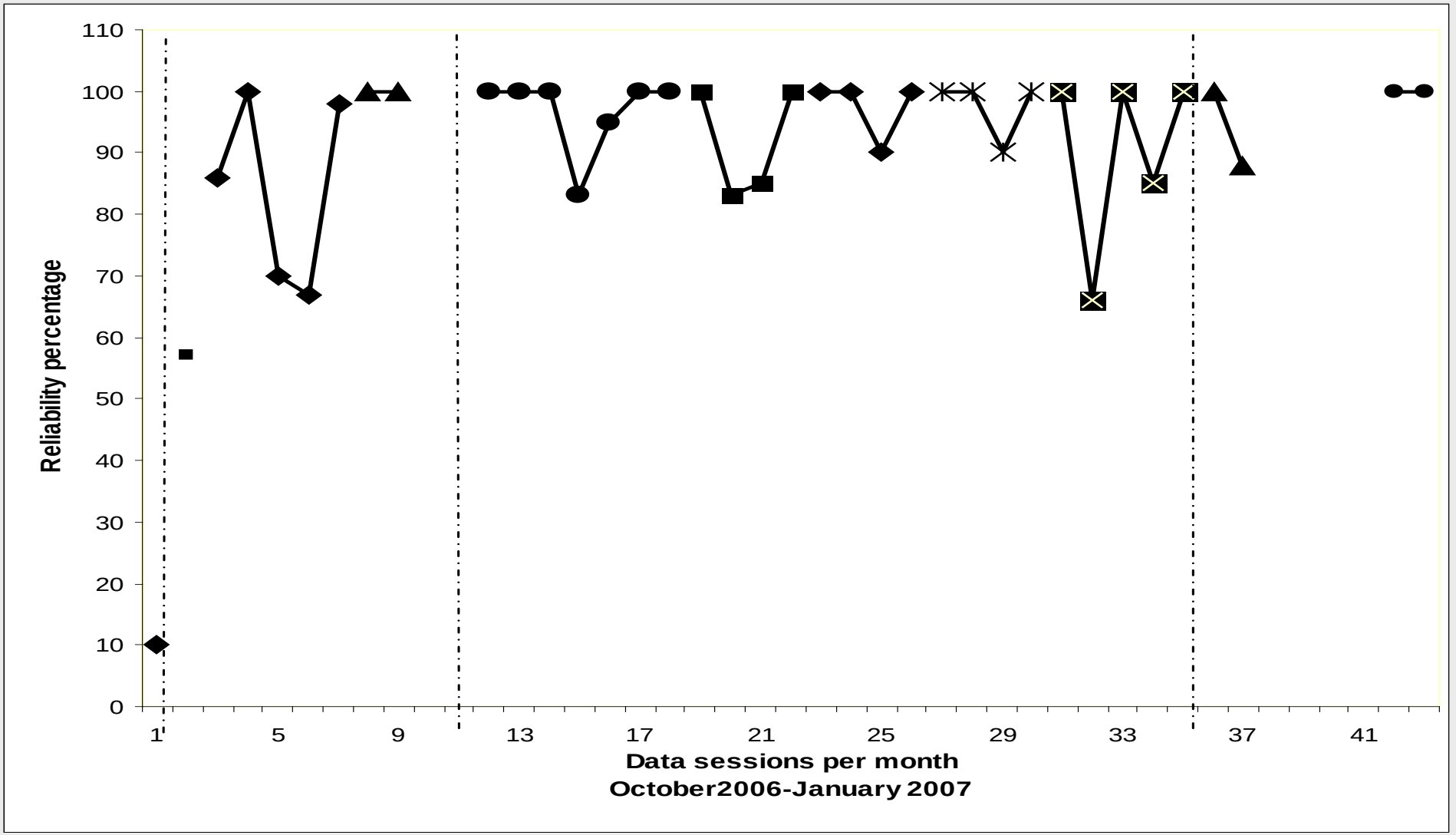
Fidelity Data



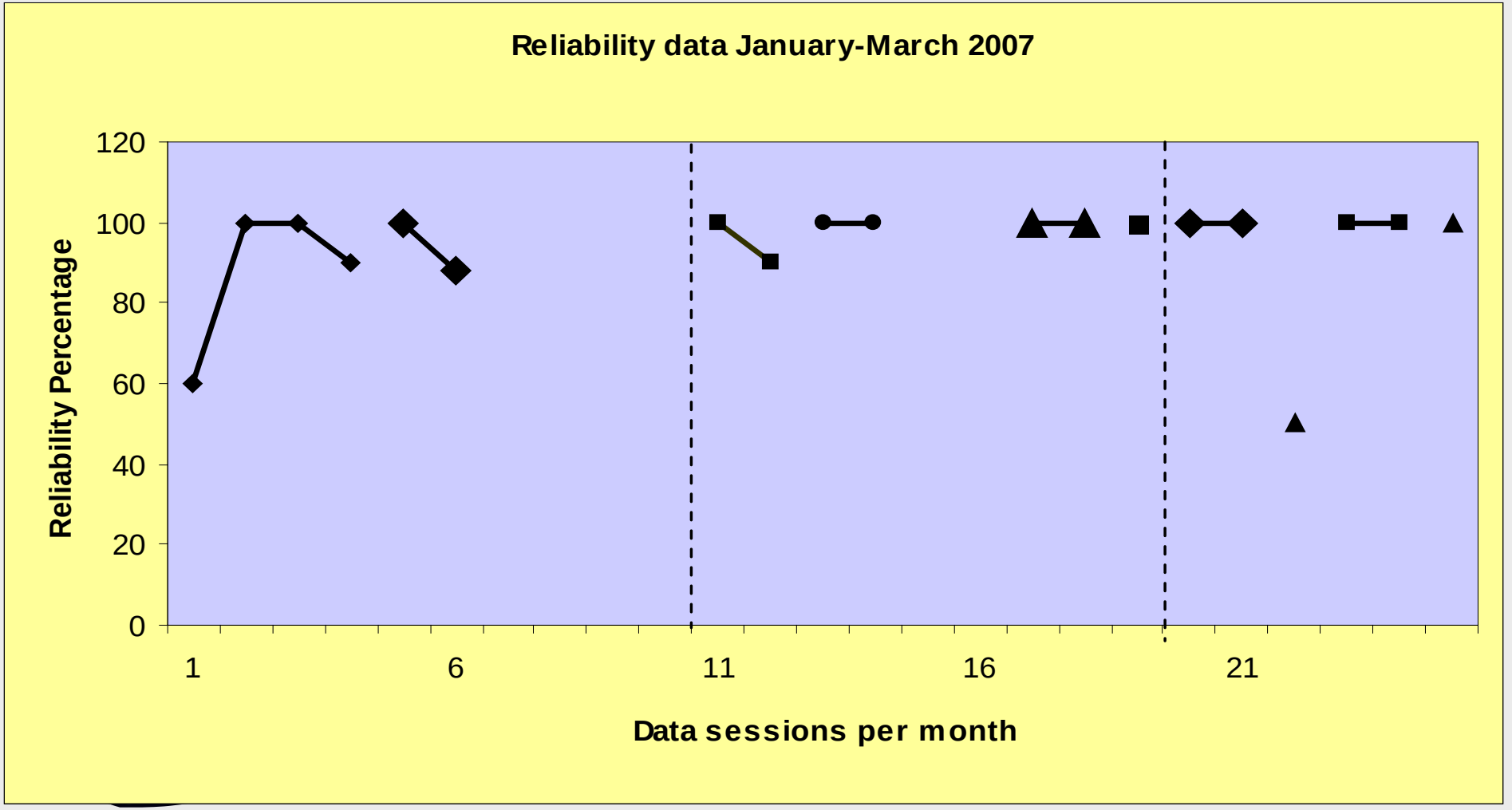
Trends


Use and Interpretation of Fidelity data
100%
80%
60%
40%
20%
0%
October
November
December
January
February
March
Looked at graph
Needed technical

Reliability of Methodology

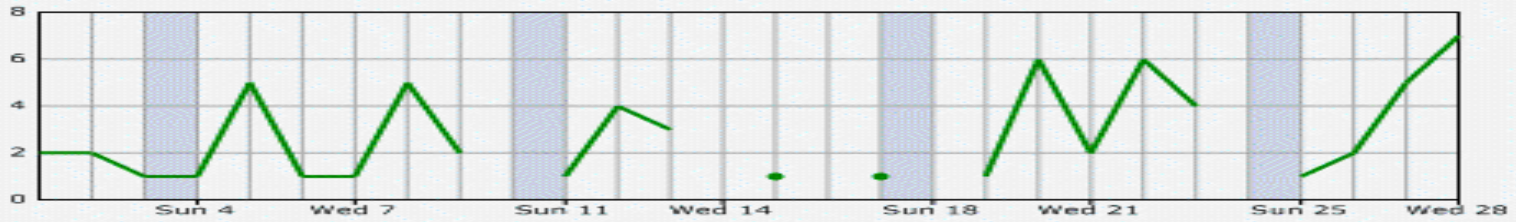


Reliability of Methodology



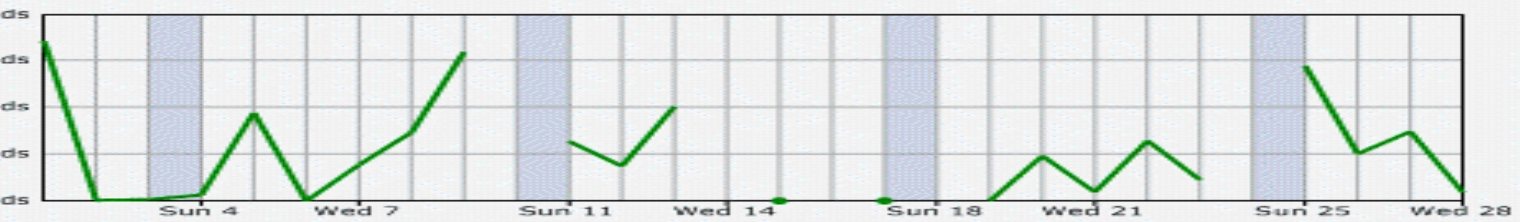
February 2007

Number of Visitors



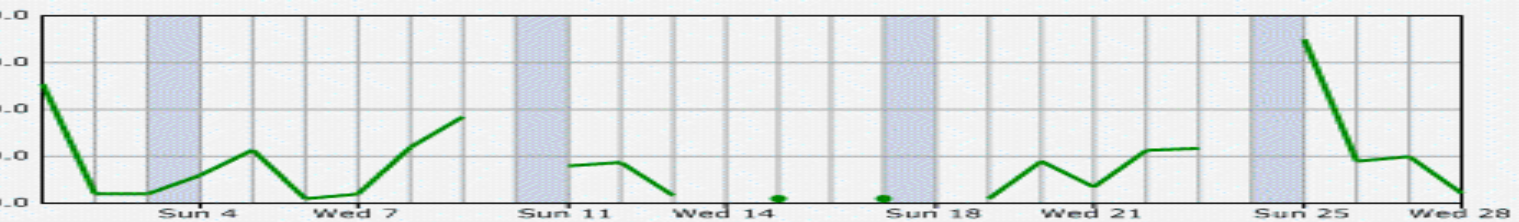
Show details

Average Time On Site



Show details

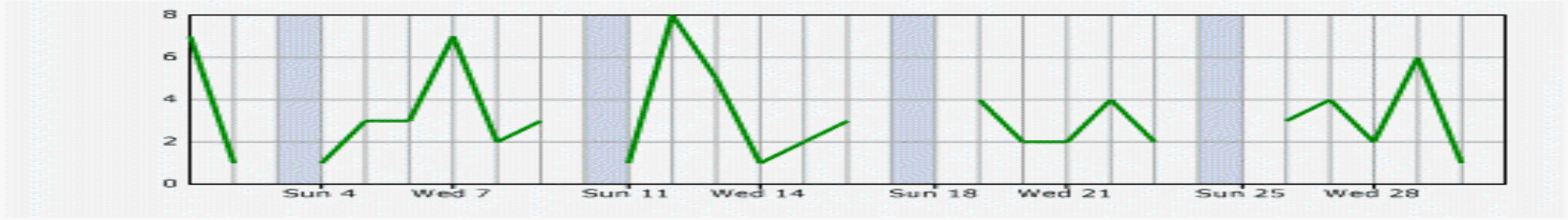
Page Views per Visitor



Show details

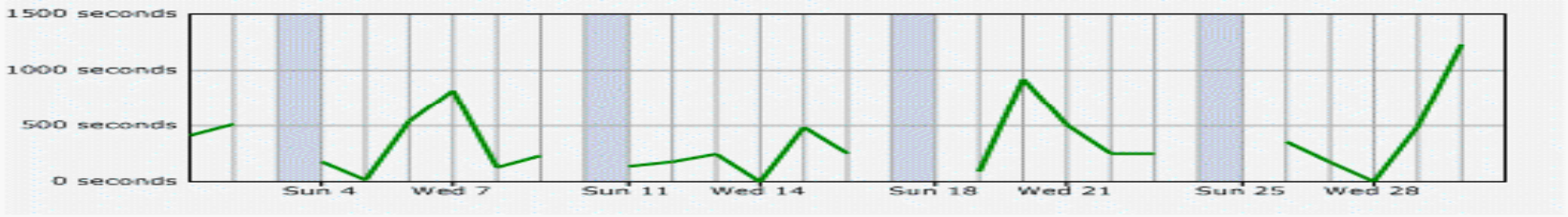
March 2007

Number of Visitors



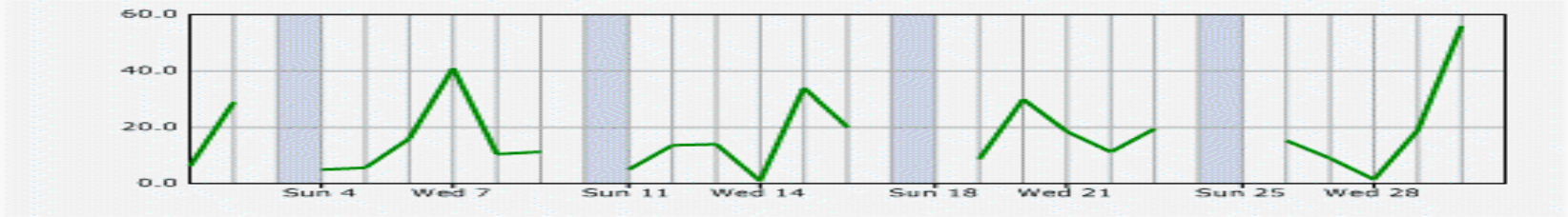
Show details

Average Time On Site



Show details

Page Views per Visitor



Show details

Paired *t* test Results of Visits

- **P value and statistical significance:**
  The two-tailed P value equals 0.0936
  This difference is not statistically significant.

- **Confidence interval:**
  The mean of Feb minus March equals -0.778
  95% confidence interval of this difference: From -1.721 to 0.165

- **Intermediate values used in calculations:**
  t = 1.9023
  df = 8
  standard error of difference = 0.409

Paired *t* test Results of Time

- **P value and statistical significance:**
  The two-tailed P value is less than 0.0001
  This difference is statistically significant.

- **Confidence interval:**
  The mean of Feb minus March equals -352.789
  95% confidence interval of this difference: From -437.701 to -267.877

- **Intermediate values used in calculations:**
  t = 9.5809
  df = 8
  standard error of difference = 36.822

Paired *t* test Results of Pages Viewed

- **P value and statistical significance:**
  The two-tailed P value equals 0.0021
  This difference is statistically significant.

- **Confidence interval:**
  The mean of Feb minus March equals -10.578
  95% confidence interval of this difference: From -16.025 to -5.131

- **Intermediate values used in calculations:**
  t = 4.4783
  df = 8
  standard error of difference = 2.362

Review

Visits

Group	**Feb**	**March**
Mean	2.433	3.211
SD	1.074	0.848

Time

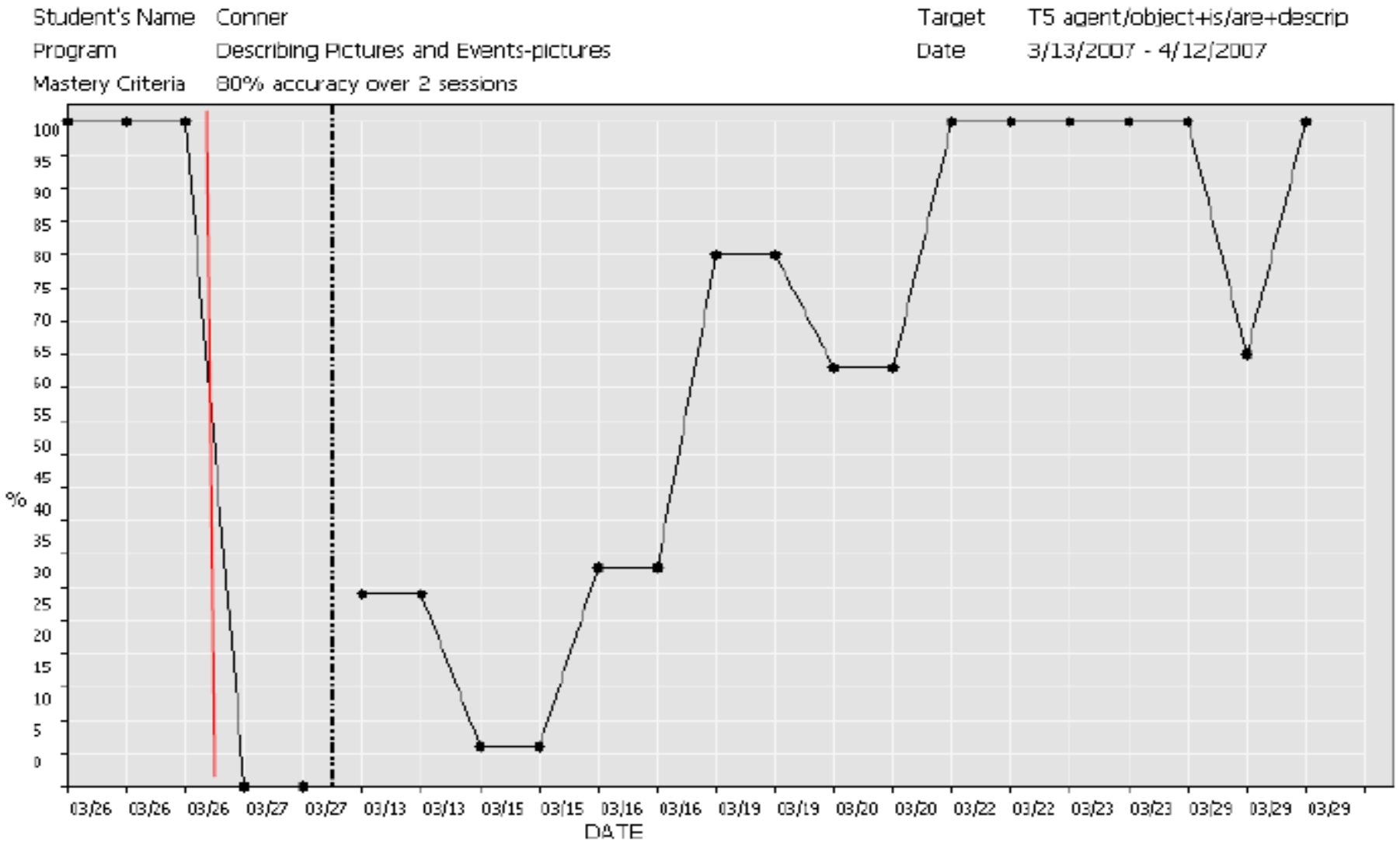
Group	**Feb**	**March**
Mean	20.322	373.111
SD	16.196	114.326

Pages

Group	**Feb**	**March**
Mean	7.756	18.333
SD	6.699	5.430

- Increase in traffic as expected in March (more participants)
- Time on site increased from 20 seconds to 6 minutes
- Pages viewed per visitor increased from 8 pages to 18 pages

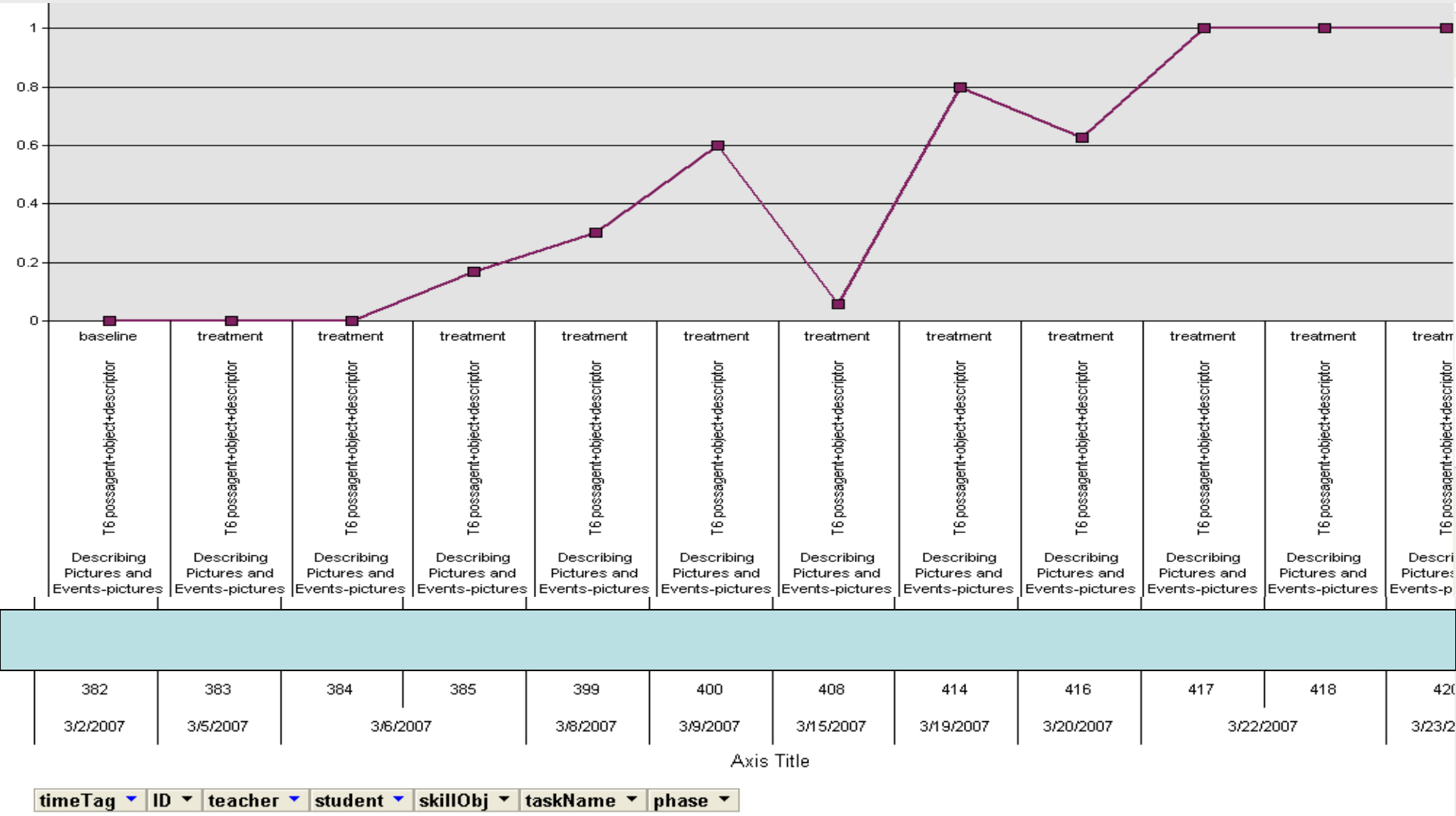
Print Evidence in Progress



Anecdotal Evidence

- T6
- Variability in performance shown on graph with one teacher
- Brought up on Wednesday meeting
- Not all teachers had the same operant definition
- Needed both parts of the response to be correct (e.g., The boys face is dirty. The girls face is clean)
- Reached consensus on what was correct

T6 Anecdotal Evidence of Making Data-Driven Decisions



Sites and Contacts

- KIHd System Project Website

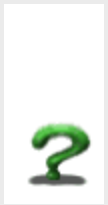
http://kihdsystem.gmu.edu/stepstone/index.html

- KIHd System

http://kihdsystem.gmu.edu

Helen A. Kellar Institute for Human disAbilities

- (703) 993-3670 (voice/TTY)
- (703) 993-3681 (fax)
- http://kihd.gse.gmu.edu



Questions