


Adaptive Book
"A Platform for Interaction, Collaboration and Analysis"
 Ananda Gunawardena, Carnegie Mellon University, CS Department

Electronic Books


- Current electronic textbooks are
 - simply an electronic version of the printed book
 - Limited value
 - Or too expensive to produce
 - limited market demand
- A great deal of customization and personalization of the content is needed to generate interest in electronic books
- Adaptive Book is a textbook platform for customization, personalization and facilitating reading comprehension



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Tablets and Textbooks

- The most natural device for electronic books
 - Highlight with the pen
 - Write annotations on the book
 - Write on the margins
 - Share handwritten notes with others
 - Ideal for personalization
- High Potential but..
 - Need better tools to interact using digital ink
 - Tablet prices need to come down
 - Need better DRM solutions
- Read the article "students replace textbooks with Tablet PC's" – Pittsburgh Tribune Review – May 9th, 2005
 - <http://www.cs.cmu.edu/~ab>




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Digital Book

- What is a digital textbook?
 - Electronic version of the printed book?
 - Or an enhanced platform to support course pedagogy?
- Adaptive Book (AB) is designed to be a platform for textbooks (or any structured content).


AB supports:
 Customization
 Interaction
 Collaboration
 Markup Analysis



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Our Research Goals

- Understand how students and instructors use textbooks
 - Behavior modeling with HCI usability analysis
 - contextual inquiry, cognitive walkthrough, think aloud
- Develop technology tools to support effective behavior and increase motivation
- Measure impact of reader technology
 - Impact on Reading comprehension
 - Impact on learning with pre and post test analysis
 - Human computing
 - Gaming



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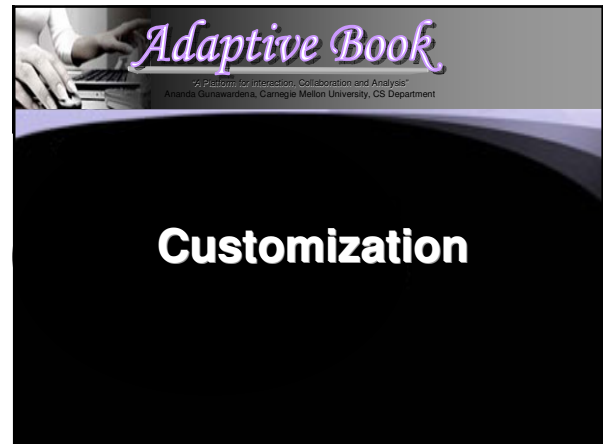
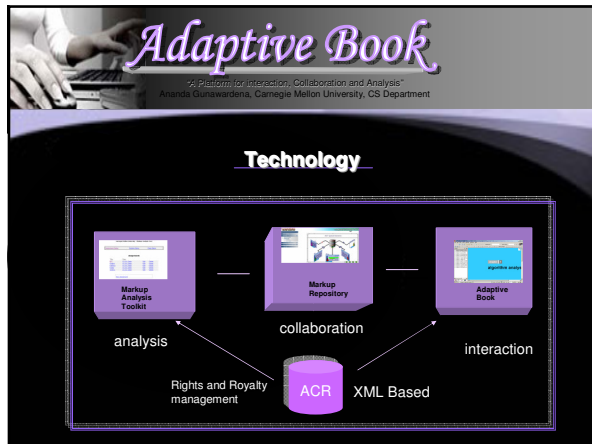
User Activity 1

- Download the Adaptive Book thin client
 - <http://www.cs.cmu.edu/~ab/HP>
 - Both Adaptive Book Technology and Textbook content are copyrighted and should only be used for demo purposes
- If you are offline ask Chantelle Humphreys
 - Ask for a flash drive
 - Download and install
 - Ask for installation instructions
- Don't have MS .net installed on your machine?
 - Google Search: "MS .net download"
 - Download
 - Microsoft .NET Framework Version 1.1 Redistributable Package
 - Or Ask for a flash drive
- Ask for an installation instruction sheet from Chantelle if not given one upon entrance



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Adaptive Book Technology



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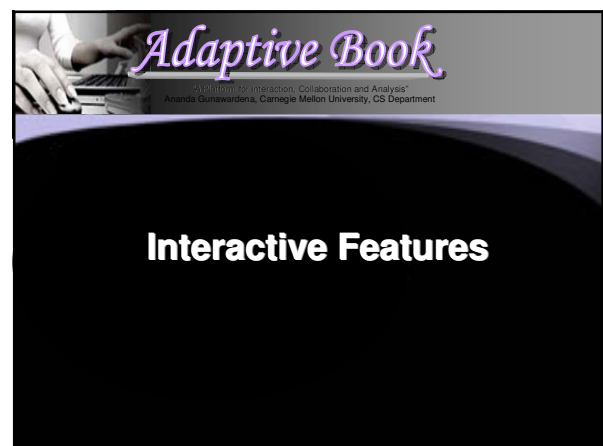
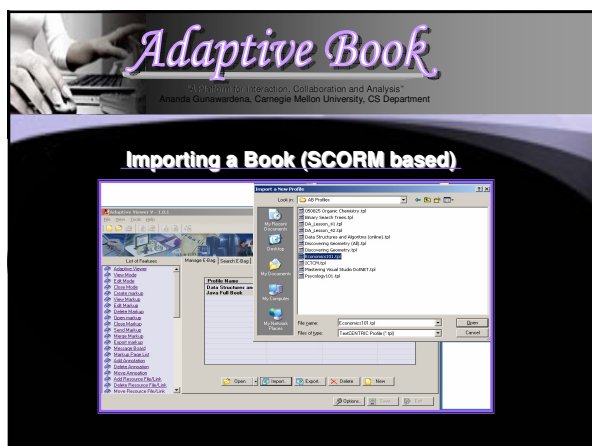
Creating A Custom Book

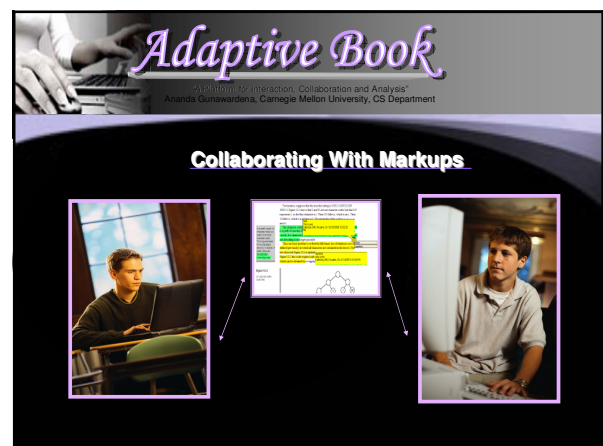
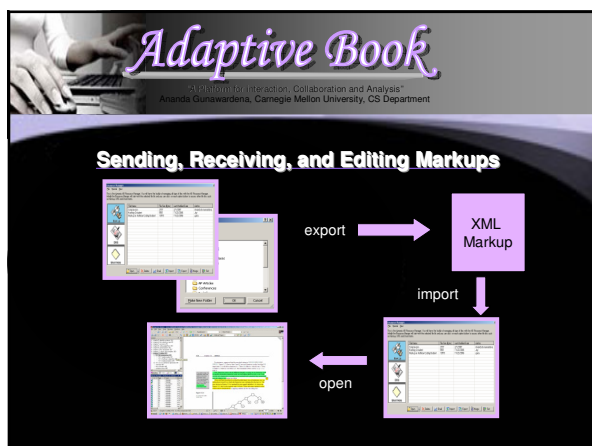
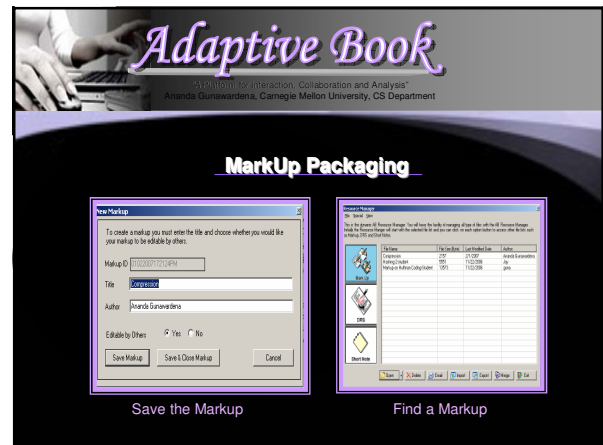
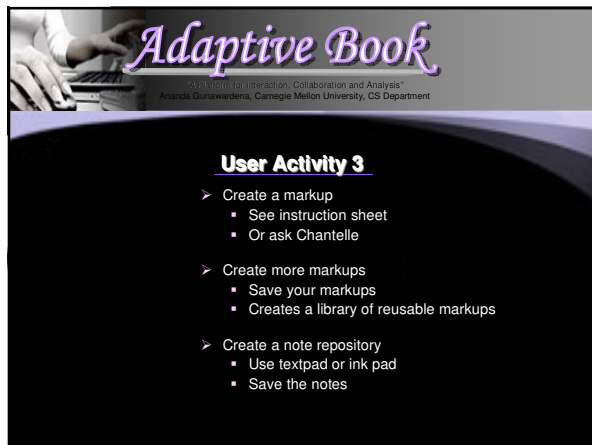
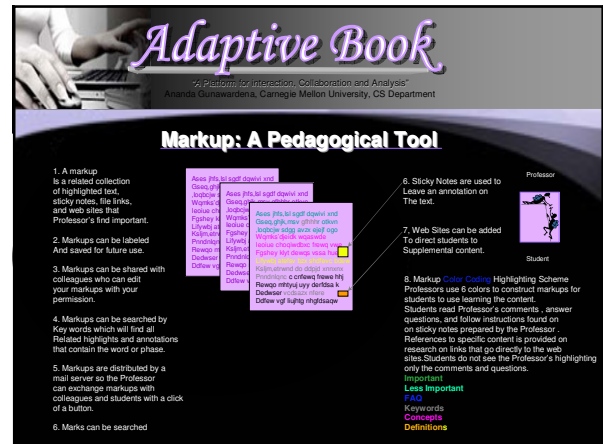
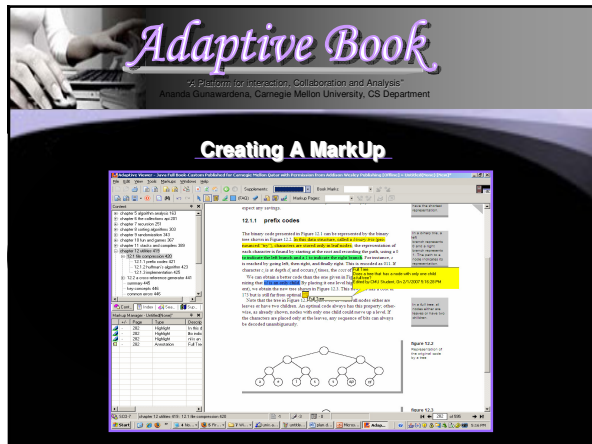
- The first step in making textbook more effective is making a custom book by the instructor
- Select the chapters, reorganize, add your own content, make a book in minutes
 - Print output and electronic output
- AB technology used by Pearson Custom Choices

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User Activity 2

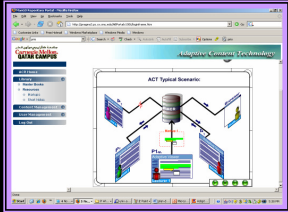
- Download a custom book from
 - <http://www.cs.cmu.edu/~ab/HP>
 - Import the book to Adaptive Book
- Ask Chantelle Humphreys
 - Ask for a flash drive
 - Ask for custom book installation instructions





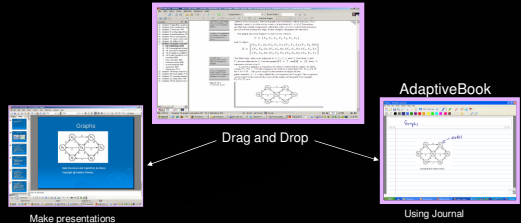
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MarkUp Repository



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Other Tools



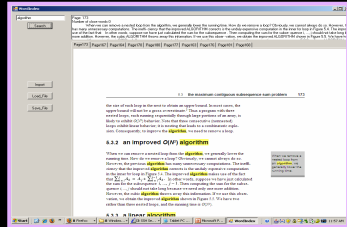
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Search and Clustering

- Students see this as the most useful feature in an electronic book
- We have designed a specific search engine for providing useful information to students
 - Search results can be ranked by various criteria's
 - Word relevancy
 - markup ranking

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Search and Clustering



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Using Adaptive Book In Class

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Instructor Use

- Set pre-reading targets
 - Apply reading strategies
- Measure pre-lecture comprehension
- Send a pre-lecture markup with key concepts
- Send a post-lecture markup with details
- Ask students to summarize and create one single markup

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Student Use

- Read the book before the lecture
 - 60% thinks this improves their comprehension
- Search and quickly find important things
 - 80% of the student think that the distinct advantage of the platform is
 - search and cluster
- Markup the content
 - Reading with markups always improves comprehension
- Measure comprehension
 - Do pre and post lecture markup analysis

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Reading Comprehension

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Measuring Reading Comprehension

- Reading comprehension is the process of constructing meaning from what was read
- Reading comprehension is being able to summarize information to create your own view of the world

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Expert Role

- Experts of subject matter can quickly pick out the important points from the book
- A book annotated by instructor is quite useful to the student
 - Available only after student has attempted to read and comprehend material
- Experts can create semantic linking between paragraphs of the text

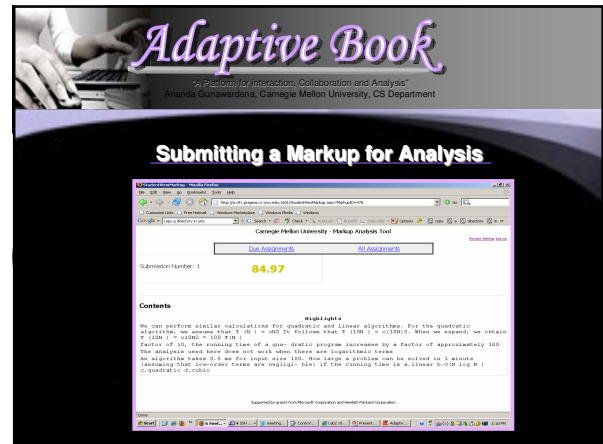
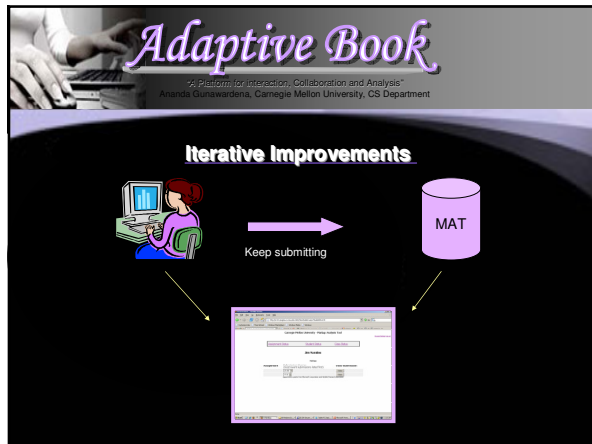
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User Activity 4

- Measure your "reading comprehension"
- Download the question markup from
 - <http://www.cs.cmu.edu/~ab/markups>
- Add your own annotations to show what sections might help answer the question. Save and export the markup to desktop
- Submit the markup to
 - <http://srv01.pragma.cs.cmu.edu:1601/Login.aspx>
 - Login as HPUSER6 through HPUSER20
 - No password necessary
- Submit the markup and compare to my markup
 - Do you agree with the results?

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Measuring Understanding



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Qatar Results

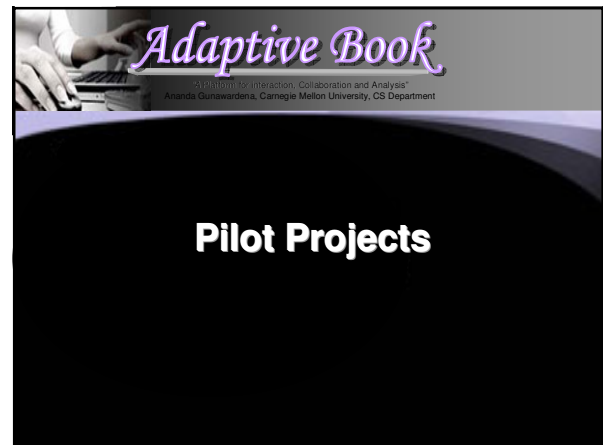
Class: 15-211 Qatar Points left: not provided Due on: not provided

Exception: Chapter 14 of the Weiss book.

[Submit Expert Markup](#) (refresh all expert markup) [Remove Expert Markup](#)

You have submitted an expert markup.
Students' markups can now be analyzed.

Student	Submission Scores (most recent submissions listed first)	View Submission
Agha, Lina	86.38	View
Khaili, Maryam	86.18	View
Gedawy, Hani	86.51	View
Farahat, Fatima	86.85	View
Bawazir, Alva	91.11	View
Alismail, Hatem	109.06	View
Al-Warad, Jafar	88.15	View
Al-Sayed, Marwan	88.85	View
Al-Mulhemoud, Al-Muhammad	88.85	View
	25.33	



- # Adaptive Book
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- ## Adaptive Book Pilot Schools
- San Jose State University – 2004
 - Used a custom Adaptive book for Business course
 - O'Reilly Publishers
 - Tablet PC's
 - Article on this available on HP website
 - The Ellis School – 2004-2007
 - Classroom presenter and Adaptive book
 - 8th Grade Geometry book + Tablets
 - More likely than college students to adopt electronic textbooks
 - Mt Lebanon School – 2005-2006
 - Organic Chemistry book for High School Seniors
 - Glendale Elementary School – 2006-
 - Tablet Math Whiz and Adaptive Book for Elementary kids
 - Carnegie Mellon University – 2004-2007
 - Several computer Science courses
 - Students "owned" the Tablets
 - Carnegie Mellon University – Qatar -2005-2008
 - Computer Science classes in a multicultural environment
 - Grove City College – PA – 2006-2008
 - DyKnow and Adaptive Book
 - Pilot ongoing

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- ## Ellis School Pilot Tablets and Textbooks
- Ellis School – private all girls school
 - Equipment
 - Provided all 8th grade Geometry students with Tablet PC's
 - Adaptive Book and Presenter
 - Methods
 - Train the teacher to conduct the class using Presenter (slides prepared with images and notes from the book) and electronic book
 - Regular textbook Reading Assignments
 - Measurable outcomes
 - attitude and behavior changes
 - Perception changes
 - adaptation - textbooks became indispensable
 - compared to same class taught by the same instructor w/o ebook and classroom interaction

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CMU Pilot Using a Markup Repository

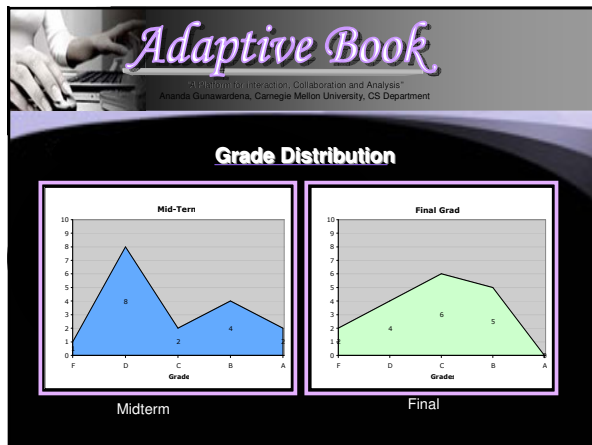
- Carnegie Mellon Computer Science Students
- Equipment
 - Provides students with a copy of AB
 - Students "owned" the tablets
- Methods
 - Availability of instructor markup library for programming code
 - Markups are available upon receiving at least 50% of the grade for a comparable markup
 - could do without – but a way to force them to read first
 - Markup feedback provided – 60% students asked for markup help.
- Metrics – Comparison of program completion time of those who looked at the markups versus those who did not
 - more likely to complete the assignment faster
 - hugely beneficial for beginner programmers
 - not experienced enough to always find what they want
 - Markups gave them a way to focus on what is really necessary.
 - no studies done on experienced programmers

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CMU Qatar Improving Comprehension

- Carnegie Mellon University – Qatar campus students
- Equipment
 - HP Tablets + Adaptive Book + Presenter
- Methods
 - Reading is tied to a concept
 - 6 concepts tested
 - Start with reading strategies (developed by CMU English Department)
 - Encourage them to follow strategies
 - Reading Technical textbooks in English was hard
 - Arabic to English
 - Tools to write in Arabic on the margins of English Textbook
 - Give a targeted pre-lecture reading assignment - measure
 - Improve with post lecture – measure
 - Iterative improvements – measure with feedback until a target
- Metrics – Grades during midterm and final exam
 - helped lower end of the students
 - can be extended to improvements in individual assignment



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Ongoing Projects

- Grove City College, PA
 - Funded by Microsoft Tablet PC Grant 2006
 - Uses DyKnow and Adaptive Book technologies
 - Over 1200 students impacted
 - Over 20 faculty participation
 - Various disciplines – Computer Science, Accounting, Statistics, Chemistry
 - Goal is to measure pre and post lecture impact and collaboration aspects using Dyknow and AB tools

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Conclusion

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Pilot Design and Integration Into Courses


- What is possible with Adaptive Book?
 - Pre and post lecture reading comprehension
 - Reading Summarization capabilities
 - Student-Student and Student-faculty Collaboration
 - Use of markup repositories and impact on learning
 - Bilingual reading comprehension
- Design the study with control groups
- CMU is interested in working with you
 - <http://www.cs.cmu.edu/~ab/HP>
 - Can provides resources and partnership opportunities
 - Funding and textbook acquisition
 - Contact: Chantelle A. Humphreys
 - chumphre@andrew.cmu.edu



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Pilot Execution


- Some road blocks
 - Getting the books from the publishers
 - Typically provided through editor
 - Can take up to 3 months to obtain permission
 - Main issue is DRM
 - Getting students to read the book
 - Motivation and Reward system
 - Problem solving approach
- Instructor commitment
 - Integrating reading and other activities into the course
 - Measuring impact – resource intense




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Summary

- Adaptive Book technology is exciting
 - Many potential benefits
 - Interaction, collaboration and analysis
- We will continue to develop technology to support and change student-faculty behavior
 - Research in Human Computer Interaction and Machine learning
- Technology should be transparent and integrated into their process to make learning better
- That is our vision and we think with Tablets in education we can make the learning process better and outcomes measurable



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Current Collaborators:
 Andrew Owens (Cornell)
 Jay Ho & Charlotte Humphreys (CMU)
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